

## REPORT DOCUMENT

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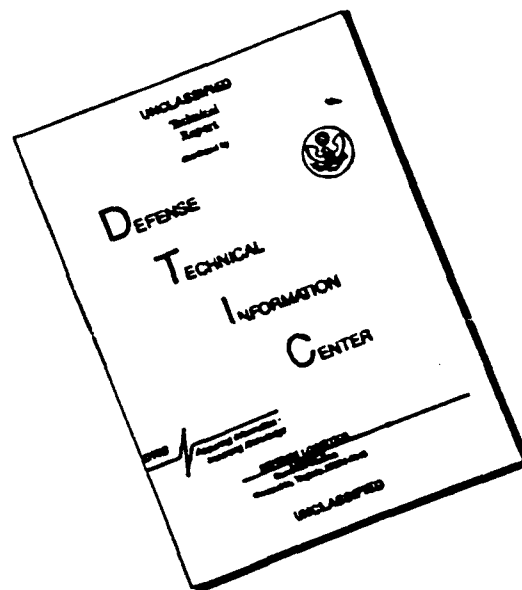
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**TECHNOLOGY INSERTION-ENGINEERING SERVICES  
PROCESS CHARACTERIZATION  
TASK ORDER NO. 1**

**DATABASE DOCUMENTATION BOOK**

**OO-ALC**

**MANPRB**

**CONTRACT SUMMARY REPORT  
15 DECEMBER 1989**

**CONTRACT NO. F33600-88-D-0567  
CDRL SEQUENCE NO. B008**

**MCDONNELL DOUGLAS**  
*McDonnell Douglas Missile Systems Company*  
*St. Louis, Missouri 63166-0519 (314) 232-0202*



1.0 IDENTIFICATION OF RCC

RCC ~~MANPRES~~ has been identified by the SOW of Contract F33600-88-D-0567 for Process Characterization.

DESCRIPTION OF CURRENT OPERATIONAL  
MANTRA AND MANTRA ARE RESOURCE CONTROL CENTER (RCC)  
UNDER MANTRA SECTION OF THE INDUSTRIAL PRODUCTS  
DIVISION (IPD) AT OORC. MANTRA AND B IS LOCATED  
IN BUILDING 507. THESE RCCS ARE LOCATED IN THE  
NORTH WEST CORNER OF THIS BUILDING. THE

THE WORKLOAD IS PRIMARILY MISTEK WORK. IT CONSISTS  
OF VARIOUS WHEELS, BRAKES, AND LANDING GEAR. THIS  
AREA IS RESPONSIBLE FOR THE MACHINING AND GRINDING  
OF THE VARIOUS PART AS WELL AS SOME OF THE CUP  
INSTALLATION ON WHEELS.

BECAUSE OF THE AGING OF THE PRODUCT MIX IT HAS  
CAUSED DIFFERENT AMOUNTS OF REWORK DEPENDING  
UPON WHAT NEEDS REPAIR AND TO WHAT EXTENT.  
IN GENERAL TERMS THESE PROCESS ARE  
SIMILAR TO THAT OF PRIVATE INDUSTRY.

# PERCENT OF OTHER WORKLOAD FOR RCC

(80/20 LISTING)

RCCs

JOB TYPES	MANPGP	MANPGW	MANPNA			MANPRC	MANPWW
TEMPORARY	13.72	2.35	15.11	1.40	1.05	1.35	1.05
MANUFACTURE	0.00	0.00	0.92	0.00	4.51	2.74	12.50
PDM	1.00	0.00	22.79	0.04	0.07	4.39	22.44
ARMAMENT	0.00	0.23	1.26	0.04	0.03	4.18	2.38
HYDRAULICS	0.00	0.05	7.00	1.11	2.67	3.88	13.99
MISER	95.29	11.57	52.92	97.41	91.69	85.46	97.69

MANPRA AND MANPRB EQUIPMENT CONSISTS OF INDIVIDUAL WORK STATIONS. AT THESE WORK STATIONS THE OPERATOR IS ASSIGNED A PIECE OF EQUIPMENT DEPENDING UPON WHAT THE OPERATORS SPECIALITY IS.

THIS COULD BE A LATH, MILLING MACHINE OR SOMETHING ELSE. EACH MECHANIC IS EQUIPPED WITH THEIR OWN TOOL BOX. THIS TOOL BOX CONTAINS ALL OF THE APPROPRIATE TOOLS TO ACCOMPLISH THE GIVEN TASKS ASSIGNED TO THAT WORK STATION. THE SHOP IS ALSO EQUIPPED WITH OVER HEAD CRANES WHICH ASSISTS THE OPERATORS IN THE LOADING AND UNLOADING OF THE LARGE AWKWARD PART ONTO THEIR MACHINES.

## THE STANDARD REPAIR PROCEDURE FOR PARTS

COMING INTO THE MACHINE SHOP IS AS FOLLOWS;

A- THE COME IN THROUGH RECEIVING AND ARE THEN LOGGED INTO THE SCHEDULERS SYSTEM.

B. THE SCHEDULER AT THE BEGINNING OF EACH WEEK WORKS UP A HOT SHEET. THIS HOT SHEET IS THEN GIVEN TO EACH OF THE FOREMAN.

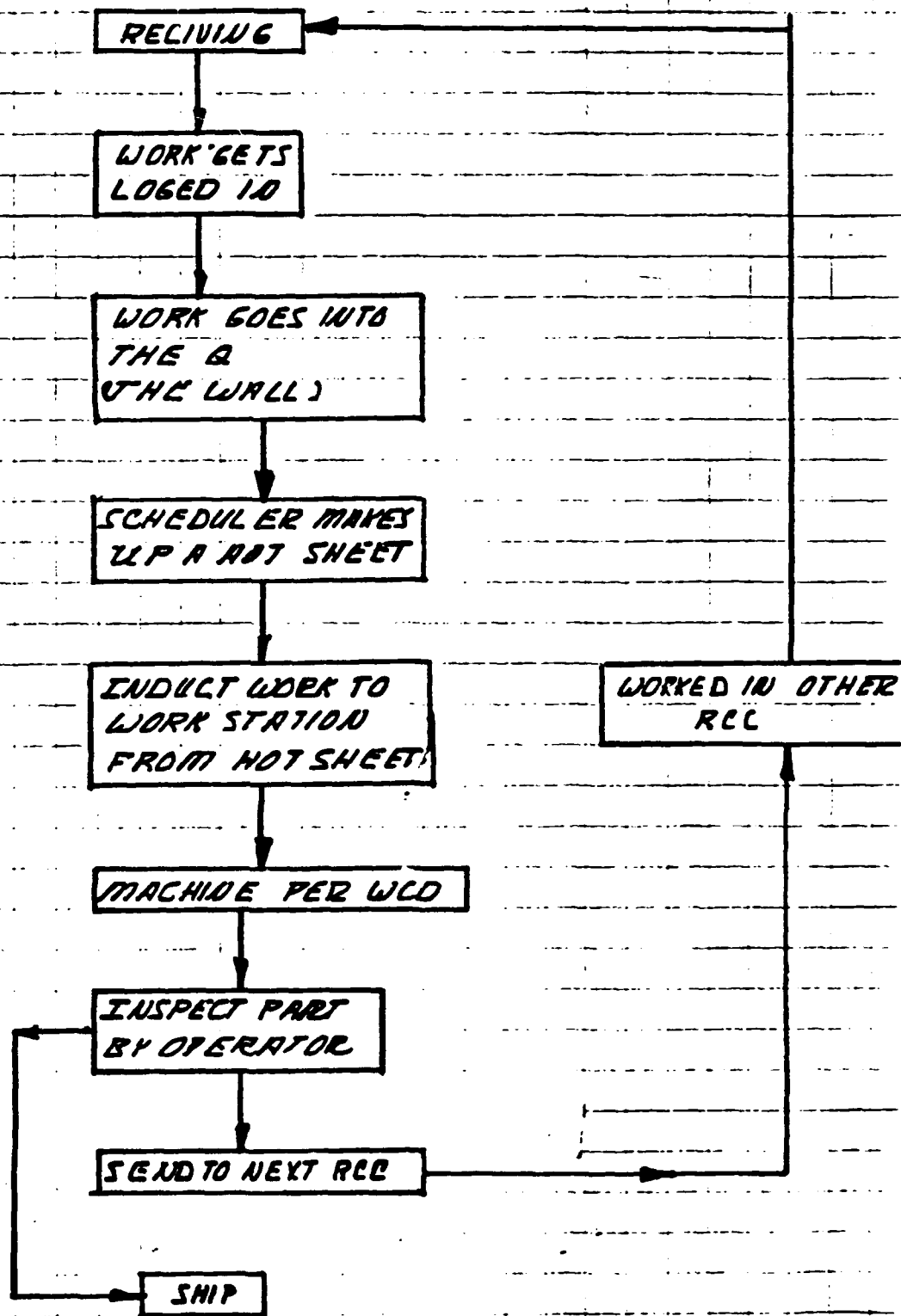
C WHEN THE MECHANIC NEEDS SOME WORK HE GOES OUT TO THE WALL TO PICK UP HIS NEXT JOB, OF COURSE HE WILL PICK UP A JOB THAT HE WANTS TO DO. NOT THE HARDEST ONE OUT THERE. HE THEN RETURNS TO HIS WORK STATION WITH THE PART.

D THE WORKER THEN PICKS UP THE 958 (WORK CONTROL DOCUMENT) AND PERFORMS ALL OF THE OPERATION CALLED OUT ON THE WCD.

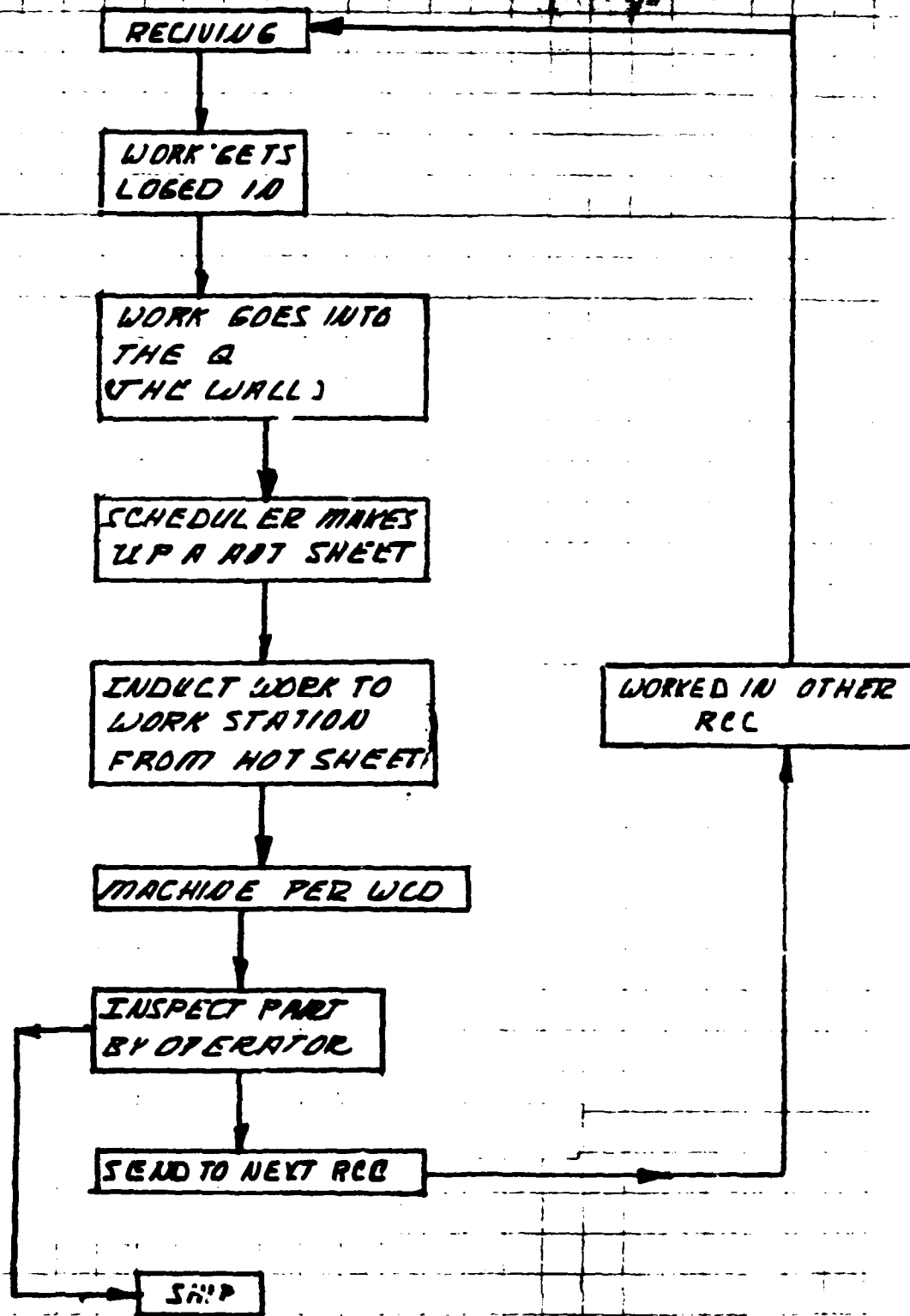
E WHEN THE OPERATOR HAS COMPLETED ALL OF THE OPERATIONS ON THE WCD. HE THEN INSPECTS THE PART. THIS MEANS THAT HE SAYS WHETHER OR NOT THE PART IS GOOD.

F SEND PART ON TO NEXT RCC.

# WORK FLOW FOR MANPREB



# WORK FLOW FOR HANDLER



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THERE IS A QUICK FIX OPPORTUNITY IN THE AREA OF BUSHINGS. AT PRESENT THE PARTS ARE SPENDING A LOT OF TIME WAITING FOR THE CORRECT BUSHINGS TO COME IN. WE WOULD SUGGEST THAT SUPPLY INCREASE THEIR VENDOR LIST SO THAT THEY CAN OBTAIN THE BUSHING WHEN THEY ARE REQUIRED. THIS WOULD IMPROVE THE THROUGH PUT OF ALL THE RCCS WHICH WERE STUDIED IN TASK ORDER ONE. IT WOULD REDUCE MACHINE TOOL DOWN TIME THE REASON FOR THIS IS THAT IF THEY DO NOT HAVE ANY BUSHINGS THEY CAN NOT RUN THE PARTS THROUGH THE PROCESS.



### FOCUS STUDY

AT THE PRESENT TIME THERE IS NO WAY AVAILABLE TO THE PERSONEL IN THAT DEPARTMENT FOR INSPECTING THE RELATIONSHIPS BETWEEN THE "PAIR" FEATURES.

A COORDINATE MEASURING MACHINE WOULD ENABLE THE SHOP TO MORE ACCURATELY INSPECT THEIR WORK IN THESE CRITICAL AREAS.

THIS WOULD ELIMINATE THE COSTLY REWORK AT FINAL ASSEMBLY AS WELL AS DECREASING THE TIME AT FINAL ASSEMBLY.

A QUICK EYE OPPORTUNITY FOR IMPROVING THROUGH

PUE IN 505, 511 AND 507, WOULD BE TO IMPROVE  
PRODUCT SCHEDULING AND PRODUCT FLOW.

IF THESE PARTS WERE SCHEDULED IN AT THE CORRECT  
TIME AND IN THE CORRECT LOT SIZE, IF THESE PARTS  
WERE THEN DELIVERED TO THE MECHANICS ACCORDING  
TO THE CORRECT PRIORITY; THIS WOULD INSURE  
THAT THE PARTS THAT WERE USED TO COMPLETE  
A PARTICULAR END ITEM WOULD BE COMPLETED  
ON TIME.

THIS WOULD ALSO TURN TIME WASTED, LOOKING FOR PARTS.  
(ONE THE MECHANIC WOULD PREFER TO DO) IN TO  
PRODUCTIVE PROCESSING TIME. THE THROUGH PUE  
WOULD BE INCREASED DO TO IMPROVED PRODUCT FLOW.

THE SECOND QUICK FIX IS - INSTALL A SYSTEM

THAT MONITORS THE PARTS IN THE SYSTEM.

YOU NEED A SYSTEM THAT CAN TRACK ANY GIVEN PART THROUGH OUT THE COMPLETE SYSTEM.

THIS SYSTEM WOULD BE ABLE TO TELL YOU HOW MANY OF WHAT PART IS AT ANY LOCATION OR IN ANY RCC IN THE SYSTEM.

THIS WOULD ELIMINATE THE MANY HOURS OF TRYING TO LOCATE PARTICULAR PARTS. AT PRESENT TIME WHEN FINAL ASSEMBLY NEEDS A CERTAIN PART TO FINISH AN ASSEMBLY, THEY HAVE TO SEND SOME ONE BACK UP THE LINE TO TRY TO LOCATE ONE.

THIS IS A VERY EXPENSIVE PROCESS. ONCE THE PART IS FOUND THEY MUST FIND A SCHEDULER. AND THEN HAVE HIM PUT THIS PART ON THEIR HOT SHEET. ONCE THIS IS DONE THE PART THEN CAN BE EXPEDITED THROUGH OUT THE REST OF THE SYSTEM.

## SUGGESTION

RUNNING THE SAME PART OVER AND OVER GETS VERY BORING. AS THE OPERATOR PERFORMS THESE MUNDANE TASK HE OR SHE LOSES INTEREST IN THE JOB. WHEN INTEREST IS LOST THE DESIRE TO IMPROVE IN ANY WAY DECREASES.

- HAVE A CLASS AND SHOW THEM HOW THEIR PARTS FIT INTO THE COMPLETE UNIT. HAVE THE PILOTS COME THROUGH THE SHOP AND TALK TO THE MECHANICS SO THAT THE MECHANICS FEEL A PART OF THE AIR FORCE. WHEN A PERSON FEELS LIKE THEY ARE A PART OF A ORGANIZATION THEY WILL WORK HARDER AND HAVE MORE PRIDE IN THEIR WORK

AT THE PRESENT TIME EACH EMPLOYEE IS TRAINED ON SEVERAL PIECES OF EQUIPMENT. WITH THE PRESENT TURN OVER. I WOULD SUGGEST THAT THEY WOULD DROP THE EXPENSIVE TRAINING AND TRAIN THEM ON JUST ONE MACHINE.

IT IS NOT FINANCIALLY SOUND IDEA TO INVEST TIME AND MONEY INTO PERSONAL WHICH ARE NOT GOING TO STAY. IN THE AREA

THE MACHINE AND GRINDING SHOPS ARE VERY WELL  
LAYERED OUT TO ACCOMMODATE THE LOADING AND UNLOADING  
OF PARTS ON TO THE MACHINES.

AT THE PRESENT TIME THE WHEEL AND STRUT  
AREA IS LARGER THAN REQUIRED FOR THE  
PRESENT WORK LOAD WHICH IS GOING THROUGH  
THE SYSTEM.

## THE MANAGEMENT OF FLOOR OPERATIONS.

AT THE PRESENT TIME WHEN THERE IS A PROBLEM  
WITH A PART THAT IS NOT COVERED W THE T.O.

THEY HAVE TO CALL ENGINEERING FOR AN ANSWER.  
THE OFFICES FOR M+M ENGINEERING IS APPROXIMATELY 3 to 4 MILES AWAY.  
A LOT OF TIMES WHEN M+M. ENGINEERING

Finally come up to check out the problem;  
AT LOT OF THE TIME THEY ASK THE FORMAN.

FOR HIS INPUT ON WHAT HE WOULD DO WITH  
THE PART. (THERE IS NOTHING WRONG WITH THIS.)  
SUGGESTION.

TRAIN THE FORMAN AND GIVE THEM THE AUTHORITY  
TO MAKE THESE DECISION WHEN THE PROBLEM  
OCCURS. OR MOVE 3 ENGINEERS UP TO  
BUILDING 507- TO TAKE CARE OF ALL THE  
ENGINEERING PROBLEMS W BUILDING 507,  
505 AND 511.

THE PROBLEM IS THAT YOU HAVE ALL OF THE  
SET UP TIME INVESTED INTO THE PART (LOADING  
IT ON THE MACHINE. THERE IS ALSO THE TIME  
WAITING FOR SOME ONE TO MAKE THE DECISION  
ON WHAT TO DO WITH IT PART. (THIS IS IF THE FORMAN  
OR INSPECTION IS NOT ABLE TO MAKE THE DECISION).

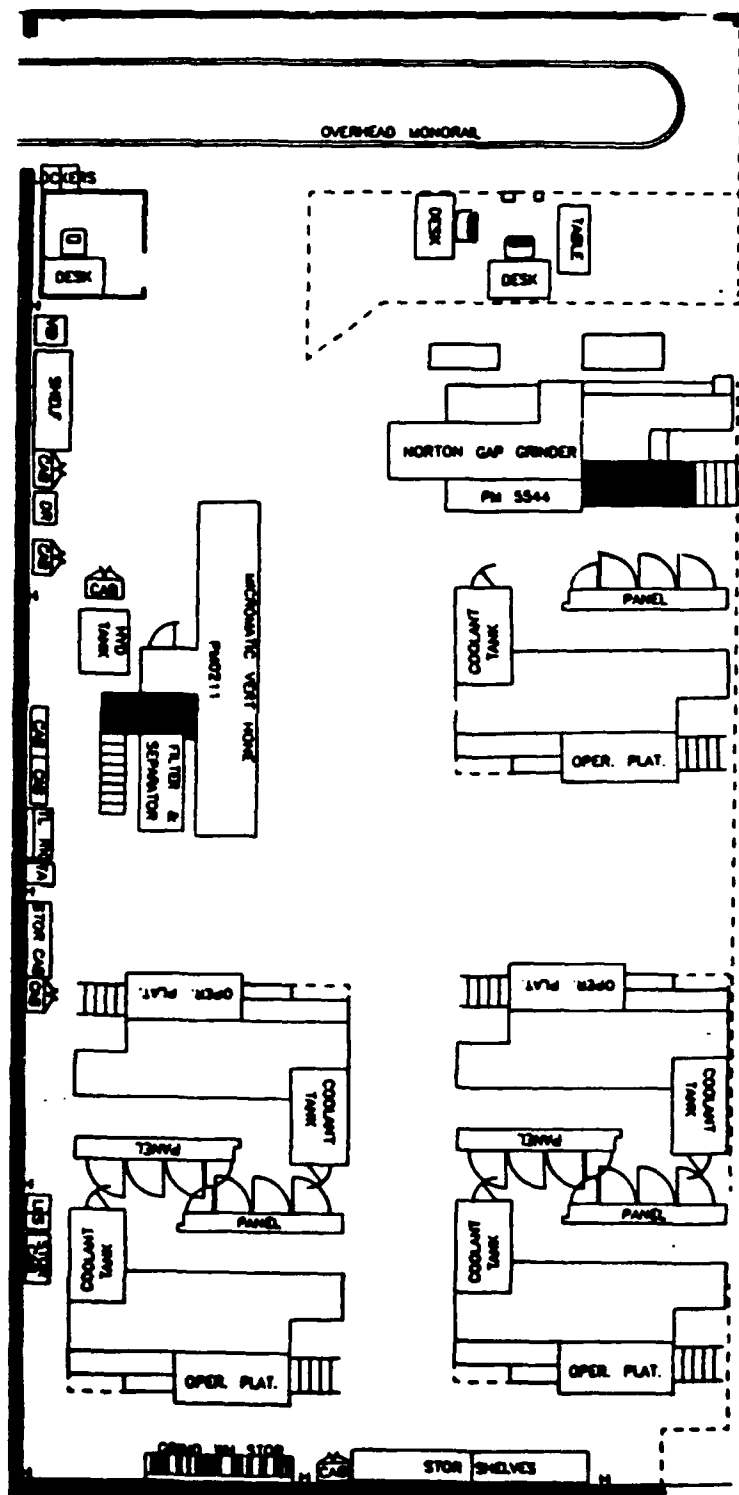
THERE IS ALSO THE TIME TO UNLOAD THE PART.

WHEN THE DECISION IS MADE THERE IS A  
GOOD POSSIBILITY THAT THE PART WILL HAVE  
TO BE RELOADED ON TO THE MACHINE.

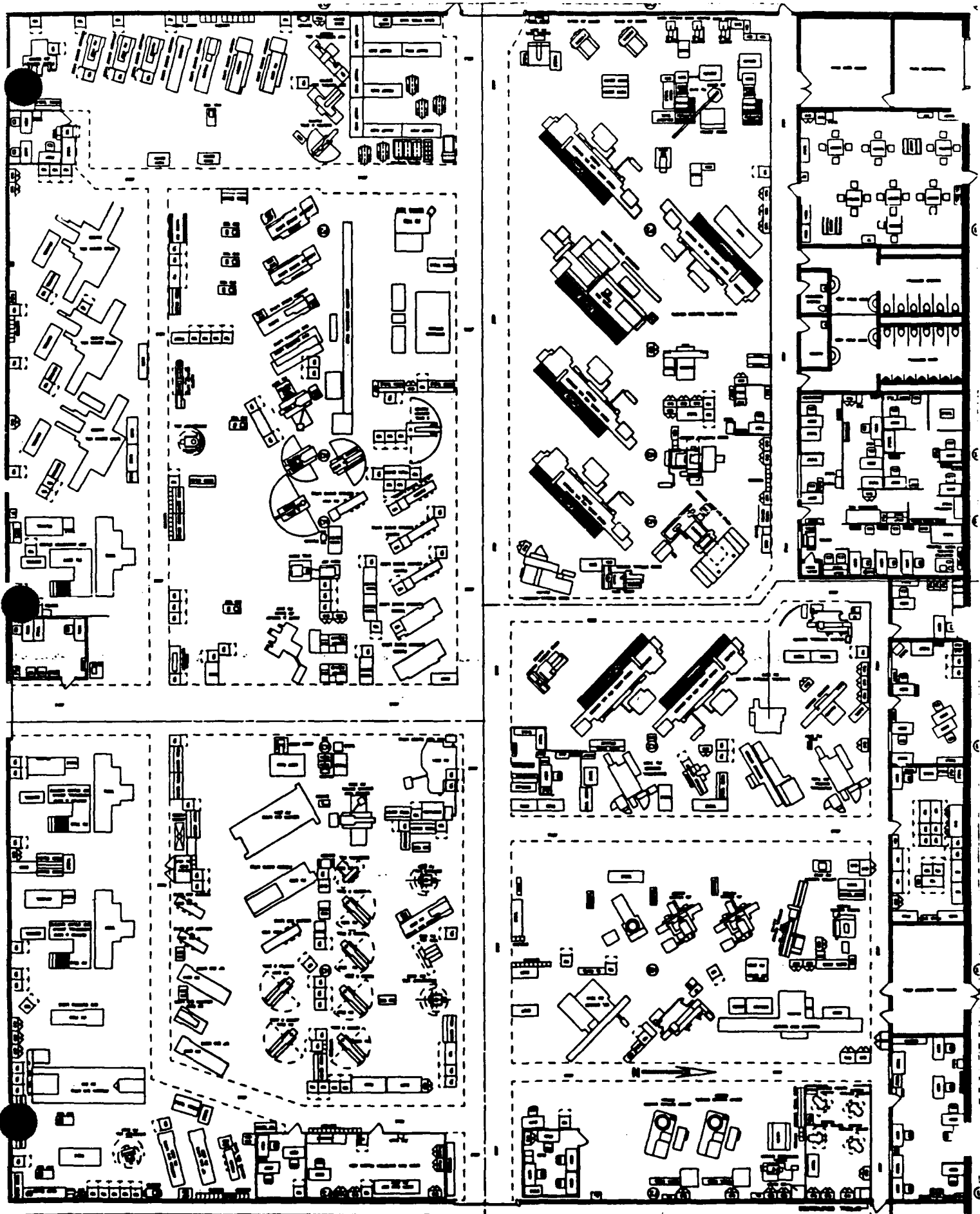
IF THE FORMAN WITH THE AUTHORITY TO MAKE DECISIONS, OR AN ENGINEER WAS READILY AVAILABLE TO MAKE THESE THE REQUIRE DECISION, AS THEY OCCUR, BY DOING THIS YOU COULD ELIMINATE THE TIME THE PARTS SET WAITING FOR A DISPOSITION TO COME THROUGH ON THEM. IF A PART COULD BE UNDER CUT AND REPLEATED THE DECISION SHOULD BE MADE AT THAT POINT IN TIME WHILE THE PART IS STILL IN THE MACHINE. THIS WOULD ALSO ELIMINATE A SECOND SET UP.

THEY ALSO NEED TO TRACK THE SCRAP. BY DOING THIS THEY COULD DISTINGUISH BETWEEN THE DIFFERENT PROBLEMS. THIS WOULD ALLOW THEM TO TRACK EACH TYPE OF PROBLEM AND TO SEE IF THERE IS A TREND OR A LARGE REOCCURANCE ON A SPECIFIC PROBLEM ON A GIVEN PART. AT THIS POINT EACH PROBLEM COULD BE ANALYZED AND THEN YOU COULD ARRIVE AT A SOLUTION TO THE PROBLEM.

# GRINDING IN 505







## Alternate Equipment

### Lathes

2570	0216	41126	} Bambrough
2571	4150	5279	
3478	4127	5278	
0572	5719		

0081	8079	5282	} Luddington
4131	0080	5288	

2574	4138	5201	} Trout
2573	7493	0508	
0215	0757	0081	
5287	5280	0213	

### Lucas Boring Mill

4583	4561	} Bambrough
4562		

### G+L

6977	7218	} Luddington
7215		

Bridgeport

4192 0460 } Trout/Luddington

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Technik

7211 7216 } Trout

---

Radial Drill

1788 2576 5329 } Trout  
2577

6135 2580 } Luddington  
5493

---

Rotary Grinder

6452 6654 } Stevens

---

Cylindrical Grinder

7400 7401 } Stevens

---

Comet

6937 6936 } Stevens

---

Internals

1402 3455 } Stevens

1391 1307 1305 } McNeely  
1308

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Barrers Vert Hume

7402 6118 } McNeely

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Super 1600s

1332 4772 4771 } McNeely

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Moore Jig Crane

1310 1312 } McNeely

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## EQUIPMENT PROFILE

NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>5-6-83</u>		RCC <u>SCND</u>		SHEET <u>1</u> OF <u>4</u>						
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (i.e. TIME NOT AVAILABLE)	ENVELOPE UNITS MIN MAX	ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	MTBF	MTTR	MTTR				
PM 1332	SUNN-HONE Sunnen Hone	1	1	0	90		1.5	965	3					
PM 4792	SUNN-HONE Sunnen Hone	1	1	0	90		1.5	164	3.7					
PM 4791	SUNN-HONE Sunnen Hone	1	1	0	90		1.5	162	2.5					
PM 5294	SUNN-HONE Sunnen Hone	1	1	0	90		1.5	299	2.4					
PM 6014	BARN-HONE Barnes Vehicle Hone	1	1	0	30		.63							
PM 1305	HLD-GRNDR ID	1	1	0	90		1.87	38	6.1					
PM 1308	HLD-GRNDR ID	1	1	0	90		1.87	34	6.6					
PM 1307	HLD-GRNDR ID	1	1	0	90		1.87	24	6.4					
PM 1391	HLD-GRNDR ID	1	1	0	30		3.7	30	9.4					
PM 1404	HLD-GRNDR ID	1	1	0	90		1.87	56	8.3					
PM 1317	HLD-GRNDR ID	1	1	0	90		1.87	41	6.2					
PM 1213	HLD-GRNDR Fender	1	1	0	90		1.87	19	7.5					

## EQUIPMENT PROFILE

NAME		TURNER		ALC		DATE		6-89		RCC		SPRINC		SHEET 2 OF 4	
EQR. MENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (a.s. TIME NOT AVAILABLE)	ENVELOP UNITS		ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHFT	DOWN TIME	MTBF	MTTR	MIN		MAX			
PM 5479	HLD-GRNDR I.O.	1	1	0	90		1.87	76	3.4			1	1		
PM 5305	LDS-GRNDR Ext. Cylindrical	1	1	0	90		1.87	35	10.1			1	1		
PM 1309	SLN-GRNDR I.O.	1	1	0	90		1.87	25	8.3			1	1		
PM 1403	HLD-GRNDR I.O.	1	1	0	90		1.87	80	3.1			1	1		
PM 3455	HLD-GRNDR I.O.	1	1	0	90		1.87	34	5.1			1	1		
PM 1462	HLD-GRNDR I.O.	1	1	0	90		1.87	52	4.6			1	1		
PM 4179	SLN-GRNDR	1	1	0	90		1.87	40	4.2			1	1		
PM 677	DBLE PRFS	1	1	0				140	5.0			1	1		
PM 7273	UNL-GRNDR Universal	1	1	0	90		2.0	20	4.0			1	1		
PM 7150	SYL-GRNDR	1	1	0	30		1.3	48	3.6			1	1		
PM 5687	SRE-GRNDR Surface Grinder	1	1	0	90		1.1	26	8.5			1	1		
PM 7111	SYL-GRNDR	1	1	0	30		1.3	82	5.2			1	1		

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## EQUIPMENT PROFILE

NAME		TURNER		ALC		DATE		5-6-77		RCC		GRIND		SHEET		3 OF 4	
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (0-8 TIME NOT AVAILABLE)	ENVELOP UNITS		ALTERNATE EQUIPMENT CODE	SOURCE		
		1st	2nd	3rd	FREQ	SHIFT	DOWN TIME	MTBF	MTTR	MM		MAX					
PM 6117	LAP MCHNE	1	1	0													
PM 1149	Lapping Machine	1	1	0	30		.50	37	51								
PM 1323	EXT GRNDR	1	1	0	90		1.87	22	10.0								
PM 7249	Thread Grinder	1	1	0	90		1.1	48	51								
PM 5307	ILG GRNDR	1	1	0	30		1.1	41	6.8								
PM 5753	PIR-ALYER	1	1	0	90		.50	72	25								
PM 4794	Refinishing Air Dryer	1	1	0	30		.5	25	28.2								
PM 7310	CIN GRNDR	1	1	0	30		.20	31	10.8								
PM 6652	SZL GRNDR	1	1	0	30		.46	42	3.7								
PM 6654	BLANCHARD	1	1	0	30		.46	53	2.7								
PM 1334	Rotary Surface Grinder	1	1	0	30		.5	79	4.5								
PM 0211	VERI-HONE	1	1	0	90		.10	38	6.9								





## EQUIPMENT PROFILE

NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>2-21</u>		RCC <u>M</u>		SHEET <u>1</u> OF <u>6</u>					
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.		DOWNTIME		PERCENT USED FOR OTHER RCCs (% TIME NOT AVAILABLE)	ENVELOPE UNITS		ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	MTBF		MTTR	MIN		
PM 5267	HOBZ-ALLIE Kerney & Trecker	1	1	0	30		.42	73	10.2		1/1		
PM 5199	VERI-MILLIE Kerney & Trecker	1	1	0	30		.42	92	8.3		1/1		
PM 1779	RAD-DRILLIE Radial Drill	1	1	0	90		1.5	354	3.8		1/1		
PM 2590	ENG-LAINE Axelson	1	1	0	30		1.0	113	7.8		1/1		
PM 2571	ENG-LAINE Axelson	1	1	0	30		1.0	208	22.0		1/1		
PM 3478	ENG-LAINE Monarch	1	1	0	30		1.0	128	17.6		1/1		
PM 0216	ENG-LAINE Monarch	1	1	0	30		1.0	228	13.4		1/1		
PM 4150	ENG-LAINE Monarch	1	1	0	30		1.0	82	7.9		1/1		
PM 4127	ENG-LAINE Monarch	1	1	0	30		1.0	121	6.2		1/1		
PM 7494	ENG-LAINE H20150H	1	1	0							1/1		
PM 5279	ENG-LAINE American	1	1	0	30		1.0	207	8.7		1/1		
PM 5278	ENG-LAINE American	1	1	0	30		1.0	118	2.6		1/1		

150-2000000

## EQUIPMENT PROFILE

SHEET 2 OF 6

RCC MACHINE

DATE 3-6-87

ALC 00

NAME Turner

EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (i.e. TIME NOT AVAILABLE)	ENVELOPE UNITS		ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	UNSCHEDULED BREAKDOWN REPAIR TIME							
								MTBF	MTTR						
PM 572	ENG - LATHE Monarch	1	1	0	30		10	40	27.5		1	1			
PM 5719	ENG - LATHE Century	1	1	0	30		10	110	7.4		1	1			
PM 7217	VERT - MILL Technics Vehicle Machining Ctr	1	1	0	30		29	36	3.4		1	1			
PM 4193	GGPT - MILL Bridgeport	1	1	0	30		42	178	4.3		1	1			
PM 0459	GGPT - MILL Series II	1	1	0	30		42				1	1			
PM 5493	RHD - DRILL	1	1	0							1	1			
PM 2580	BAD - DRILL Radial Drill	1	1	0	30		15	155	4.4		1	1		7	
PM 6135	BAD - DRILL Radial Drill	1	1	0	30		15	784	11.5		1	1			
PM 0284	ENG - LATHE Leblond	1	1	0	30		10	116	4.3		1	1			
PM 2079	ENG - LATHE Leblond	1	1	0							1	1			
PM 0280	ENG - LATHE Leblond	1	1	0	30		10	83	4.0		1	1			
PM 2172	ENG - LATHE American	1	1	0				36	3.5		1	1			

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ENCLOSURE

# EQUIPMENT PROFILE

NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>5-8-89</u>		RCC <u>MAXHIN</u>		SHEET <u>3</u> OF <u>6</u>						
EQUIP. IDENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.		DOWNTIME			PERCENT USED FOR OTHER RCCs (% TIME NOT AVAILABLE)	ENVELOP UNITS		ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	UNPLANNED REPAIR TIME	MTBF		MTTR	MIN		
PM 5288	ENG LATH E American	1	1	0	30		10	191	21.3		1	1		
PM 4131	ENG LATH E Leblond	1	1	0	30		10				1	1		
PM 5197	ENG BORER Pratt & Whitney	1	1	0	30		42	71	7.1		1	1		
PM 4140	SUNN-HONE Sunnen Hone	1	1	0	30		15				1	1		
PM 0417	SUNN-HONE Sunnen Hone	1	1	0	30		15	258	20.0		1	1		
PM 4563	BORER-MILL Lucas Boring Mill	1	1	0	30		35	28	4.8		1	1		
PM 4562	BORER-MILL Lucas Boring Mill	1	1	0	30		35	28	8.0		1	1		
PM 4561	BORER-MILL Lucas Boring Mill	1	1	0	30		35	20	4.2		1	1		
PM 6977	HORZ-MILL GFL	1	1	0	30		35	23	7.3		1	1		
PM 6584	TURN-LATH E Verticle Tool Line	1	1	0	30		50	46	16.6		1	1		
PM 7216	VERTICAL MILL Verticle MACHINING CENTER	1	1	0	30		29	61	6.0		1	1		
PM 0561	Rockford Mill	1	1	0	30		42	112	4.4		1	1		

## EQUIPMENT PROFILE

NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>5-6-89</u>		RCC <u>MACHIN</u>		SHEET <u>4</u> OF <u>6</u>		SOURCE		
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME		PERCENT USED FOR OTHER RCCS (9.9 TIME NOT AVAILABLE)	ENVELOP UNITS	ALTERNATE EQUIPMENT CODE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	BREAKDOWN REPAIR TIME	MTTR			
PM 0361	VERI MILL Cincinnati	1	1	0							1	
PM 4112	BGP MILL Bridgeport	1	1	0				85	13.6		1	
PM 5268	ROKZ MILL K&T	1	1	0				174	9.9		1	
PM 7211	HACH-CNIB Teknics	1	1	0							1	
PM 2571	RAD-DRILL Radial Drill	1	1	0	20		15	73	2.0		1	
PM 5329	RAD-DRILL Radial Drill	1	1	0	20		15	280	4.0		1	
PM 1788	RAD-DRILL Radial Drill	1	1	0	20		15	157	5.0		1	
PM 2571	RAD-DRILL Radial Drill	1	1	0	20		15	211	4.0		1	
PM 5494	RAD-DRILL Radial Drill	1	1	0							1	
PM 5685	DRILL-OVEN Drying Oven	1	1	0							1	
PM 7211	ENG-DRILL Lehigh	1	1	0	20		10	482	16		1	
PM 7211	AXELSON Axelson	1	1	0	20		10	81	7.4		1	

## EQUIPMENT PROFILE

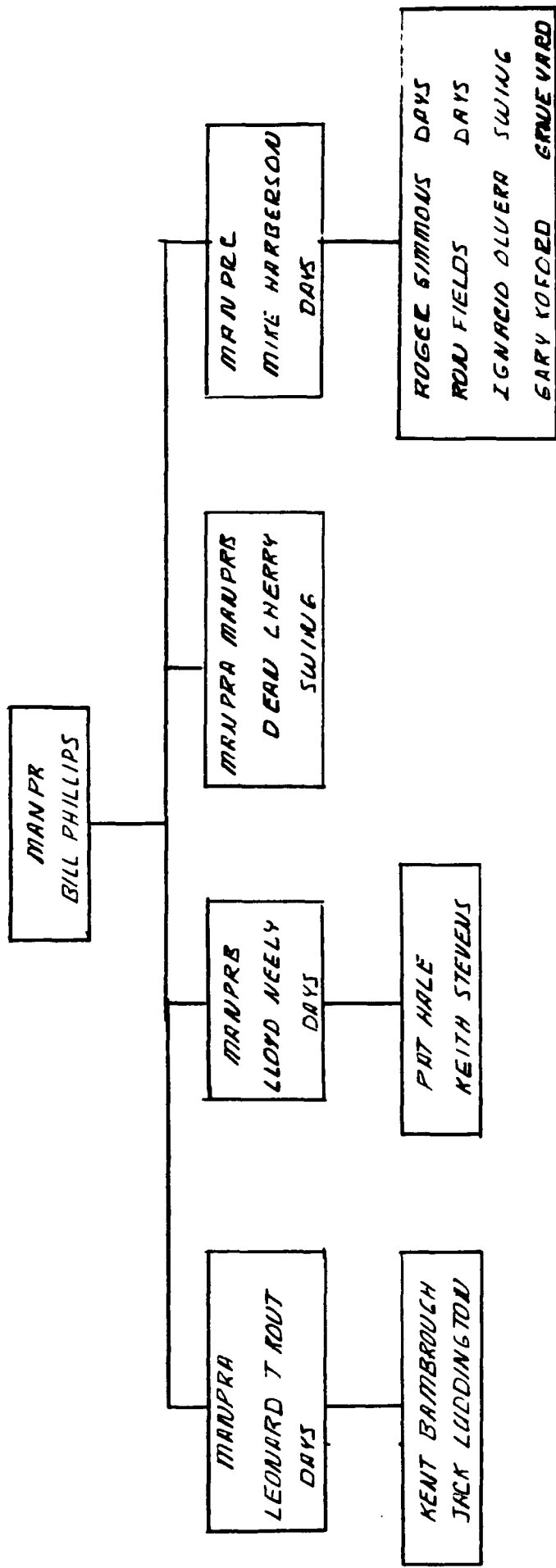
NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>6-89</u>		RCC <u>MACHIN</u>		SHEET <u>5</u> OF <u>6</u>							
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (e.g. TIME NOT AVAILABLE)	ENVELOPE UNITS		ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	BREAKDOWN MTBF	UNPLANNED REPAIR TIME MTTR	MIN		MAX			
PM 4198	ENG LATHIE Leblond	1	1	0	90		15	20	13.0		1	1			
PM 5201	ENG LATHIE Leblond	1	1	0	90		10				1	1			
	-----										1	1			
PM 0508	ENG LATHIE Monarch	1	1	0	90		10				1	1			
PM 7493	ENG LATHIE Harrison	1	1	0							1	1			
PM 6215	ENG LATHIE Monarch	1	1	0	90		10	163	9.0		1	1			
PM 5287	ENG LATHIE Monarch	1	1	0	90		10	180	3.3		1	1			
PM 5280	ENG LATHIE American	1	1	0	90		10	58	7.0		1	1			
PM 213	ENG LATHIE American	1	1	0	90		10	86	6.0		1	1			
PM 0081	ENG LATHIE Leblond	1	1	0	90		10	201	11		1	1			
PM 7276	ENG LATHIE Clausing	1	1	0				64	6.2		1	1			
PM 0160	ENG LATHIE Bridgeport	1	1	0							1	1			

## EQUIPMENT PROFILE

NAME <u>Turner</u>		ALC <u>00</u>		DATE <u>5-6-89</u>		RCC <u>MACHIN</u>		SHEET <u>6</u> OF <u>6</u>						
EQUIPMENT CODE	EQUIPMENT TYPE/DESCRIPTION	QUANTITY PER SHIFT			PREVENTIVE MAINT.			DOWNTIME			PERCENT USED FOR OTHER RCCs (i.e. TIME NOT AVAILABLE)	ENVELOP UNITS MIN MAX	ALTERNATE EQUIPMENT CODE	SOURCE
		1st	2nd	3rd	FREQ.	SHIFT	DOWN TIME	BREAKDOWN REPAIR TIME MTBF MTTR						
PM 7215	HORIZ-MILL G+L	1	1	0	20		15	26	6.4		1			
PM 7218	HORIZ-MILL G+L	1	1	0	20		15	38	8.3		1			
PM 7403	VERT-HONE	1	1	0	30		8	37	7.8		1			
PM 0757	ENG-LAINE Monarch	1	1	0				670	4.0		1			
PM 5256	ILG-BORE Prest & Wheeler	1	1	0							1			
PM 6435	HORIZ-HONE Bernco	1	1	0							1			
PM 7248	ENG-LAINE Clousing	1	1	0							1			
PM 0340	PAKEXPRESS	1	1	0							1			
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LSC-200001B



# MANPOWER PROFILE

NAME <u>Turner</u> ALC <u>00</u> DATE <u>5-22-89</u> RCC <u>MANPRA</u> SHEET <u>1</u> OF <u>1</u>		SKILL CODE/LEVEL	JOB DESCRIPTION	QUARTER	QUANTITY AVAILABLE						MANPOWER AVAILABLE (HOURS)						ALTERNATE SKILL CODE/LEVEL				
WORK WEEK					WEEKEND			HOLIDAYS			WORK WEEK			WEEKEND				HOLIDAYS			
1	2				3	1	2	3	1	2	3	1	2	3	1	2		3	1	2	3
JA07	MAINTENANCE	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
JA08	OPERATOR	1	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		4	13	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
JA09	MACHINIST	1	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		4	24	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
JA10	MACHINIST	1	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		4	20	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
JA11	MACHINIST	1	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		2	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		3	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
		4	5	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		



# MANPOWER-H PROFILE

NAME <u>Turner</u> ALC <u>00</u> DATE <u>5-22-89</u> RCC <u>MANPRG</u> SHEET <u>1</u> OF <u>1</u>		JOB DESCRIPTION		QUARTER	QUANTITY AVAILABLE				MANPOWER AVAILABLE (HOURS)				ALTERNATE SKILL CODE/LEVEL				
SKILL CODE/LEVEL					WORK WEEK		WEEKEND		HOLIDAYS		WORK WEEK		WEEKEND		HOLIDAYS		
					1	2	1	2	1	2	1	2	1	2	1	2	1
JA08				1	3	1	0	0	0	0	0	0	0	0	0	0	0
				2	3	1	1	1	1	1	1	1	1	1	1	1	1
				3	3	1	1	1	1	1	1	1	1	1	1	1	1
				4	3	1	1	1	1	1	1	1	1	1	1	1	1
				5	10	3	1	1	1	1	1	1	1	1	1	1	1
JA09				6	10	3	1	1	1	1	1	1	1	1	1	1	1
				7	10	3	1	1	1	1	1	1	1	1	1	1	1
				8	10	3	1	1	1	1	1	1	1	1	1	1	1
				9	10	3	1	1	1	1	1	1	1	1	1	1	1
JA10				10	18	3	1	1	1	1	1	1	1	1	1	1	1
				11	18	3	1	1	1	1	1	1	1	1	1	1	1
				12	18	3	1	1	1	1	1	1	1	1	1	1	1
				13	18	3	1	1	1	1	1	1	1	1	1	1	1
JA11				14	2	1	1	1	1	1	1	1	1	1	1	1	1
				15	2	1	1	1	1	1	1	1	1	1	1	1	1
				16	2	1	1	1	1	1	1	1	1	1	1	1	1
				17	2	1	1	1	1	1	1	1	1	1	1	1	1
				18	2	1	1	1	1	1	1	1	1	1	1	1	1

1.50-20001

MANPOWER PROFILE

NAME Turner ALC 00 DATE 5-23-89 RCC PRA & PRB SHEET 1 OF 1

SKILL CODE/LEVEL	JOB DESCRIPTION	QUARTER	QUANTITY AVAILABLE												MANPOWER AVAILABLE (HOURS)												ALTERNATE SKILL CODE/LEVEL
			WORK WEEK			WEEKEND			HOLIDAYS			WORK WEEK			WEEKEND			HOLIDAYS									
			1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3							
JA05	TOOL & PART	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0							
		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
		3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
		4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
JA06	TOOL & B1B	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
		2	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
		3	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							
		4	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1							

## Repair Process Technologies



Based on the current state of affairs in the machine/grinding RCC's I feel that there are only 2 major issues worth addressing at this time. These issues are scheduling & quality control. Until the problems in these 2 areas are resolved it would be senseless to consider other changes to the existing repair processes.

Currently, scheduling appears to exist only on paper. Based upon personal observations & conversations with a scheduler & several operators it seems that part flow, when not controlled by the hot sheet, is left up to the discretion & initiative of the operator.

The parts on the hot sheet are items deemed to currently be in the highest demand. These parts get attention from the appropriate area supervisor who with scheduling personnel see to it that they end up in a machine as soon as possible.

When an operator finishes a run & does not have hot sheet material to work on he goes in search of parts for his machine himself. This is not how most shops do it.

Most shops have expeditors or move people whose only function in life is to see to it that each machine has a fresh batch of

parts when they're needed.

However, before expeditors can be effective there has to be a plan for moving parts through the <sup>SHOP</sup>. I'm not referring to a method of tracking parts but rather one that determines when a specific part should arrive at a given machine & how long it needs to stay there.

This should be the job of the scheduler. The information he needs to do his job (i.e. set-up, run & inspection times) should appear on the WCD. It does not.

If the scheduler knew how long an operation took to set-up, run & inspect, then given the number of parts in a run, he should be able to predict when a batch of parts should be ready to come out of a machine.

This routine, if adhered to, allows not only the tracking of parts but also the prediction of their location at any time through the repair process. This is not currently possible & I don't think MRP is going to make it happen either.

I think that it should also be pointed out that no plan is going to improve your thru put unless you put ONE person in charge of machining, plating, flame spray, grinding & inspection. These 5 areas are all interrelated. A breakdown in

one area will have a direct effect on all of the other areas. The manager of these areas also needs the clout to hire/fire/relocate his personnel at will. He does not need new equipment in any of his areas except inspection where a co-ordinate measuring machine is needed. Barring an exceptionally long lead time on the C.M.M. there is no reason I can see that these areas could not be made to run under control in 6 months time.

Returning to the problems in question we come to Q.C. or inspection. One of the goals of any shop should be to produce parts that are in conformance, or catch & repair discrepant material before it gets to final assy. Discrepant parts should not make it to final assembly. This is happening here.

With the PAC program the operators are supposed to check their own work. This works fine as far as checking bore diameters or counterbore depths, etc. but it is very difficult to check positional tolerances in some cases. Consequently, it is not uncommon for parts to be moving through the R.C.C. with dimensional accuracy being controlled only by dialing in the machine. This results in rework in final assembly where the mechanics find it easier to file, grind or emery the parts into conformance rather than initiate the paper chase that Form 103's would require.

Again, this is not in line with industry standards.

Most shops have a Q.C. department that oversees a statistical process control program.

The success of an S.P.C. program is based on accurate knowledge of the process & the parameters that affect it. These parameters are as follows:

- Tooling/Fixturing
- N/C Program Control
- Part Control
- Operator Training
- Process Deviation Documentation

For Tooling/Fixturing it is necessary to have accurate, up to date drawings so that at periodic intervals features & surfaces subject to wear can be checked. This prevents the drifting of dimensional accuracy on process parts due to flaws in tooling/fixturing. In order to do this it is necessary to mark each ~~part~~ tool/fixture with a serial number that ties it to the appropriate drawing. This number should also appear on the WCD in the block used to describe the task performed at that particular operation.

*note: this is starting to happen on your latest WCD's*

N/C program control refers to a system which provides documentation of revision levels of process programs. The system should make it simple for the operator to retrieve the current rev. level program for the job he needs to run. The programs should have a numbering system similar to that used on mechanical drawings & this number along with

the current rev. level identifier should appear on the WCD in the block used to describe the task performed at that particular operation.

Part control refers to the need to insure that all parts arriving at any work station are all of a uniform nature. This means that parts should be deburred & blown clean of chips so that they fit properly in the next fixture. It also means that all preceeding operations have been completed.

In order to make the above controls work it is necessary to educate the shop people in the use & function of these newly installed controls. Operators must be made aware of the fixture & N/C program information provided on the WCD & they must know where to go to retrieve these fixtures & tapes.

At this point it is now time to establish process deviation documentation. To accomplish this task a batch of parts is run through a particular operation. As each part comes off the machine all features & dimensions affected by the current operation are checked 100%. The results are recorded & plotted on a graph. From this information can be determined the drift of dimensional accuracy & the resulting necessary frequency of inspection. This process is repeated for all operations on all parts in the S.P.C. program.

# Repair Process Technologies

## Flow Charts

Chart #	Description
1	Logic Flow - Ogden
2	Part Flow - Ogden
3	Logic Flow - Industry
4	Logic Flow - Industry



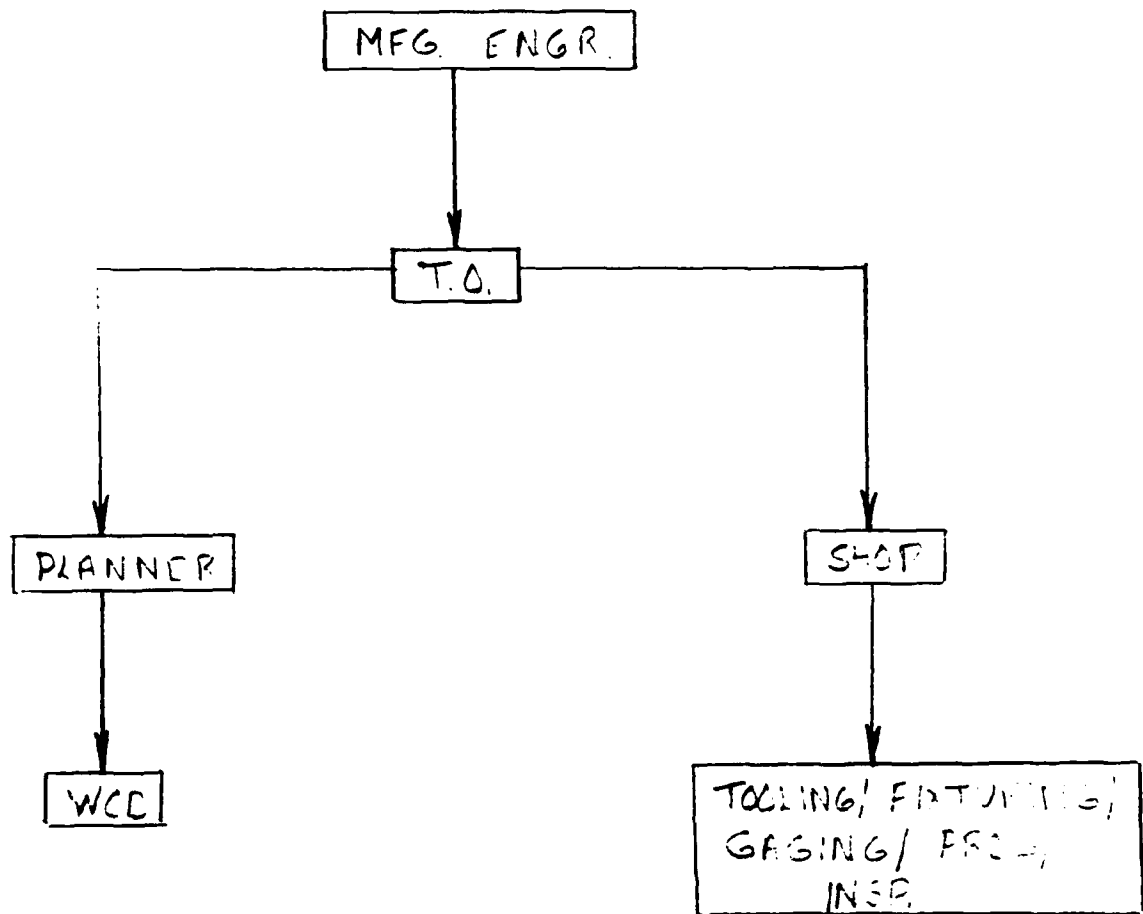


CHART 1

# CHART 2

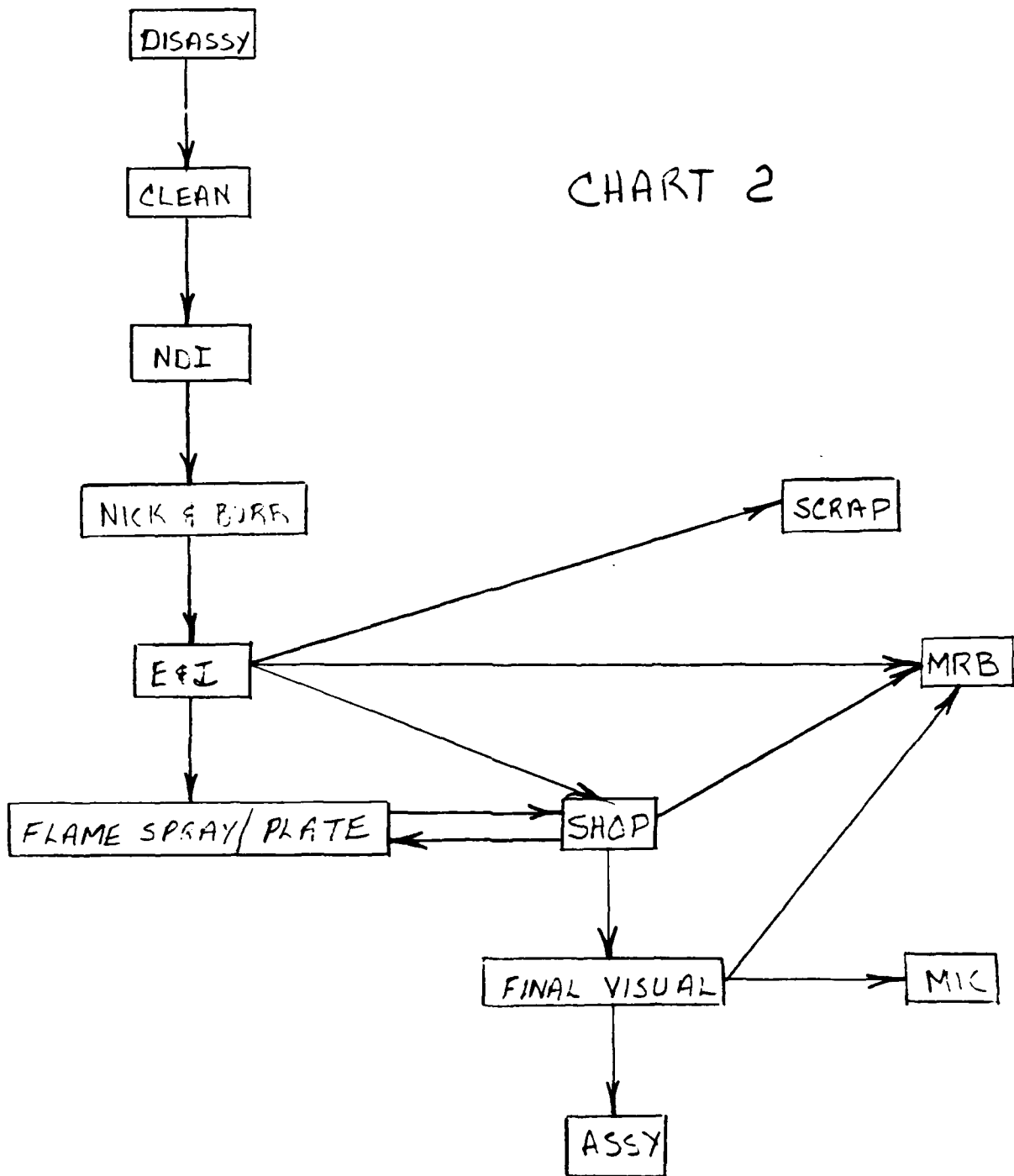
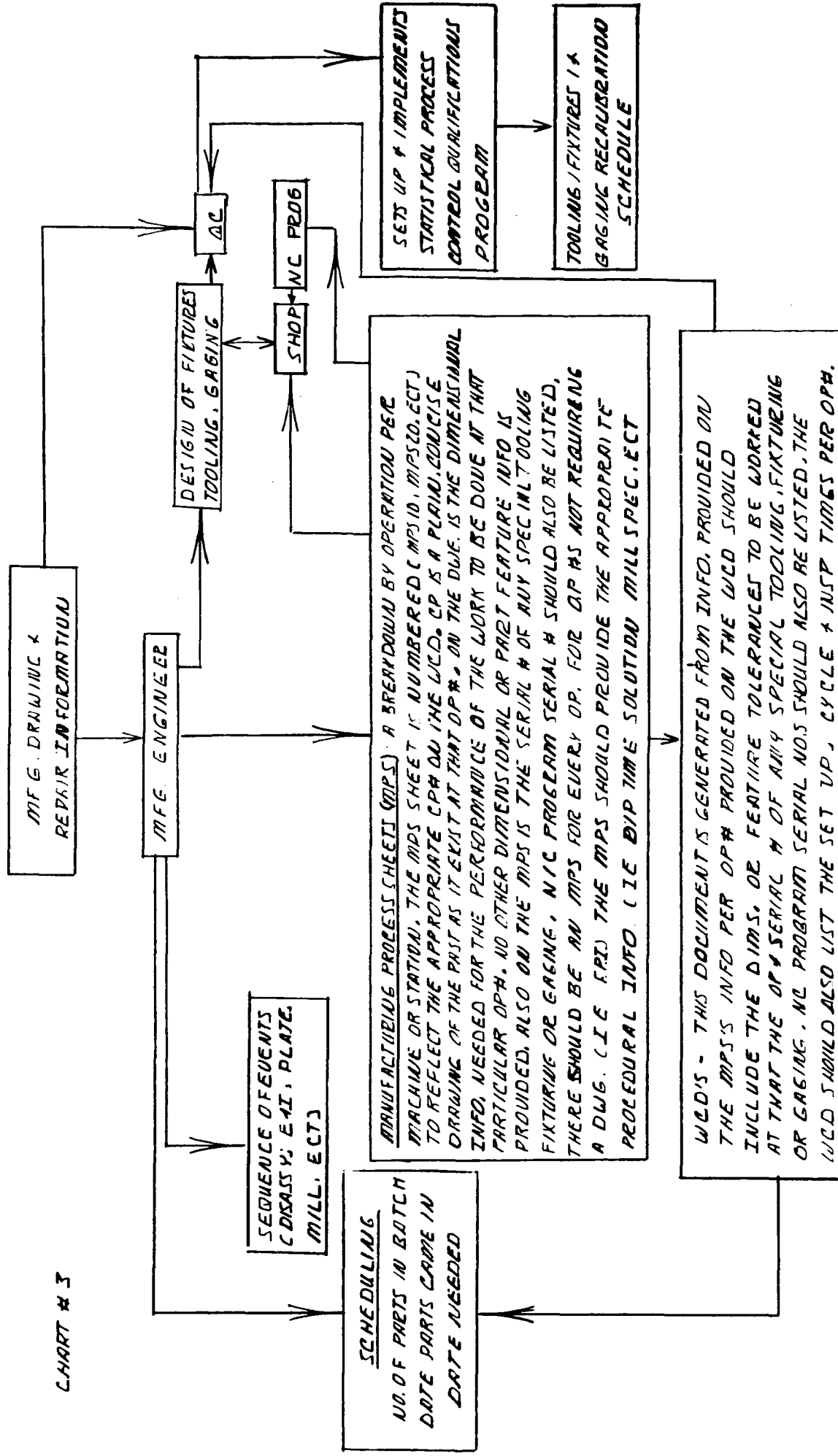


CHART # 3



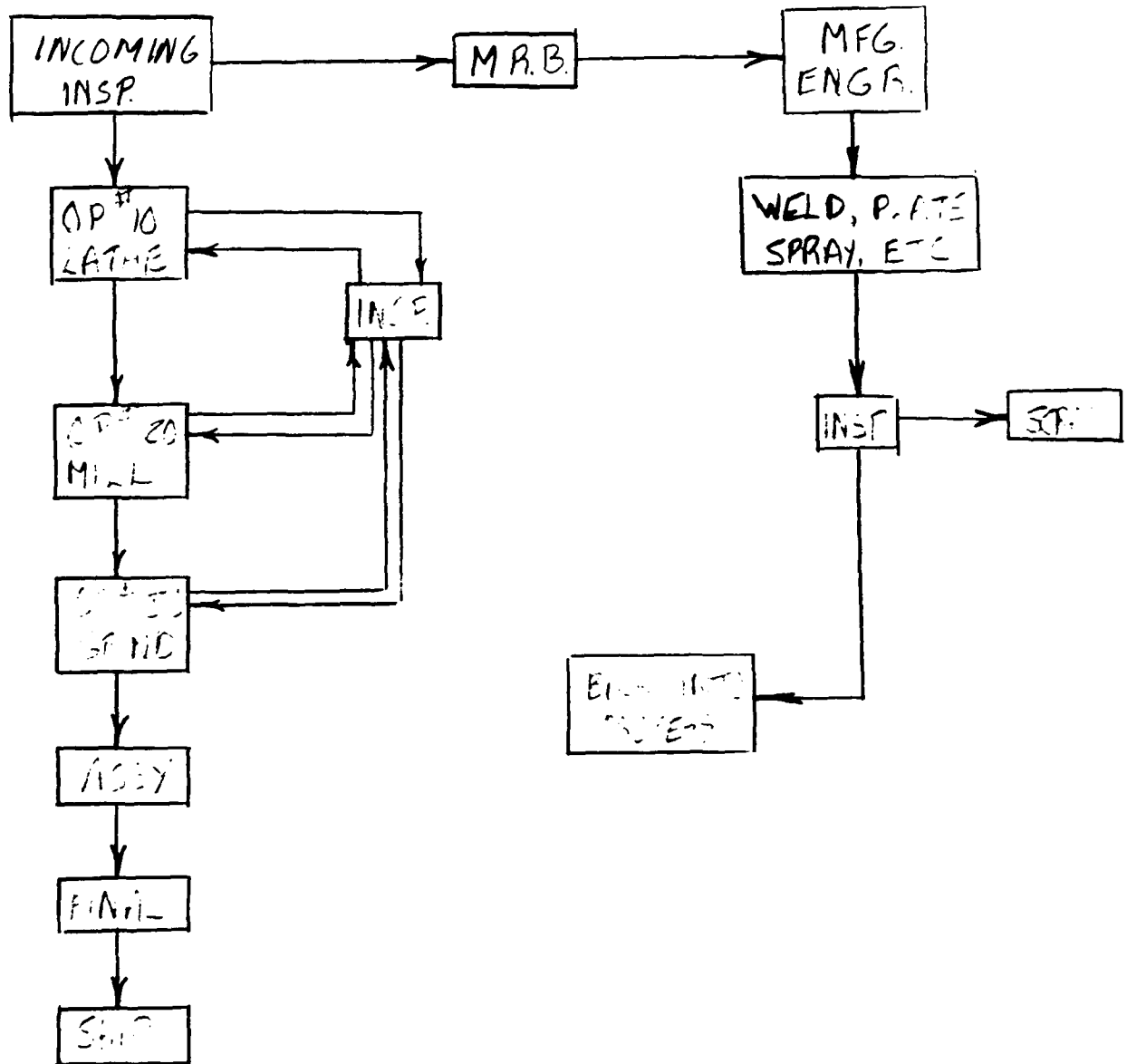


CHART 4

REVISIONS

QUALITY CONTROL OPERATION CHART

1. RECORD SERIAL NUMBERS IN ORDER OF MANUFACTURE.  
2. IF WITHIN TOLERANCE, (OPERATOR) STAMP CHARACTERISTICS CODED ⊕, ⊙, ○, ⊖ AND ⊕  
IF BEYOND TOLERANCE WRITE IN EXACT DIMENSION.

PREPARED BY: [Signature]  
APPROVED BY: [Signature]

WORK STATION  
REV. 1-24-89  
DATE 1-24-89  
SH. 2 OF 10  
G/P -/G04  
JOB NAME MILL DRILL & TAP FWD END

DATE	INSP. CODE	PART NAME	CHARACTERISTIC	Q.C. INFORMATION EQUIPMENT & TECHNIQUE	PROJECT	G. E.	PAST HIST.
		1					
		2	DIM BS				
		3	D-5	1.565 MIN	STD. MEAS. EQUIP.		
		4		SHEET #2			
		5		SECT CS-CS			
		6	J-15	.360-.362 Ø CK	PLUG GAGE		*
		7	J-15	V T Ø 0.10	FUNCTIONAL GAGE		*
		8	F-14	.490-.480	FUNCTIONAL GAGE PIN		*
		9	D-4	.400 MIN	P/N VISUAL NOTE 15		
		10	E-14	.015-.005 R	OPERATOR TO VERIFY TOOL BEFORE USAGE		
		11	F-14	BRK SHARP EDGE	VISUAL		
		12	H-15	.480-.490 Ø	FUNCTIONAL GAGE PIN		*
		13	E-16	63 H.O.S	VISUAL & COMPARISON CHART		
		14	F-15	31°-29°	OPERATOR TO VERIFY TOOL BEFORE USAGE		
		15	H-14	.03-.01 R	RADIUS GAGE		
		16	E-15	.040-.030 R	"		
		17	E-20	2.23 R	Use Fixt. E42414 DG With Gage Pins		
		18	E-19	72°	"		
		19	F-20	58°	"		
		20		35°	"		
		21					
		22					

REMARKS ALL CHARACTERISTICS DESIGNATED BY \* TO BE RECORDED.

INSP. APPROVAL

DATE 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21

INSP. STAMP

PROCESS SHEET

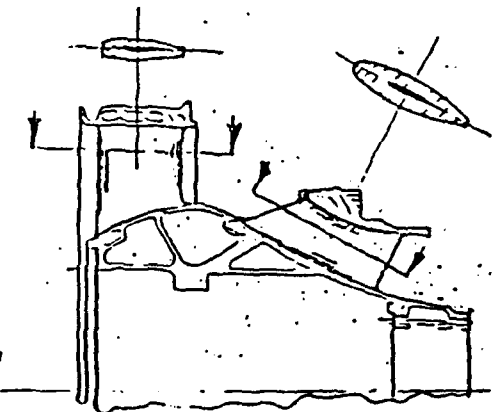
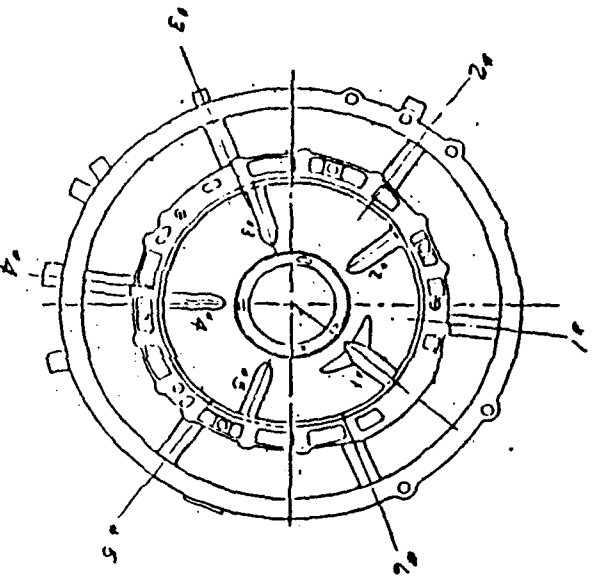


Part No. 6053768604	Part Name WHEEL RINGS	Job No.
Order No. 12	Order Description LOCAL FRT CASTING - REG. INCH	Work Station T73
SKETCH		

LOCAL FRT WANE REARS ONLY

FLUORESCENT PENETRANT INSPECT PER [P31F2] CL-A WITH THE FOLLOWING ACCEPTABILITY LIMITS:

- A) NO FURTHER INDICATIONS ALLOWED
- B) ALL INDICATIONS .04 OR LESS ARE ACCEPTABLE
- C) ALL INDICATIONS, EXCEPT CRACKS, BETWEEN .04 - .08 ARE ACCEPTABLE PROVIDED THAT THEY ARE NOT CLOSER THAN .20
- D) MICROSHRINKAGE PER DWG [10FA161] CL-30



FRONT END LOOKING FWD.

WANE SECTION VIEWS

MAP 12
U.O.S.
Locate
Clamp
Fixt.
Taps
Finish
Dec. xxx ± .005
Filler Rod
All Dia W/N TIR
Break Edges R

Drawn By S.W. 10-11-57	Engineer S.W. 10/24/57	Quality 11/17/57	Manufacturing 11/17/57	Inspection 11/17/57
------------------------	------------------------	------------------	------------------------	---------------------

# QUALITY CONTROL OPERATION CHART

100-100-100

DRWG. NO. 68 G/P 7/004 REV. 1-24-89  
OPER. NO. 100 SH. 1 OF 10 DATE 1-24-89  
OPER. NAME WILL. DRILL & TAP PWD END  
PART NAME INLET FRAME PROJECT G.E.

PREPARED BY: *W. J. [Signature]*  
APPROVED BY: *[Signature]*  
1. RED SERIAL NUMBERS IN ORDER OF MANUFACTURE.  
2. IF MIN TOLERANCE (OPERATOR) STAMP CHARACTERISTICS CODED  $\oplus$ ,  $\ominus$ ,  $\odot$ ,  $\odot$  AND  $\oplus$   
IF MAX TOLERANCE WRITE IN EXACT DIMENSION.

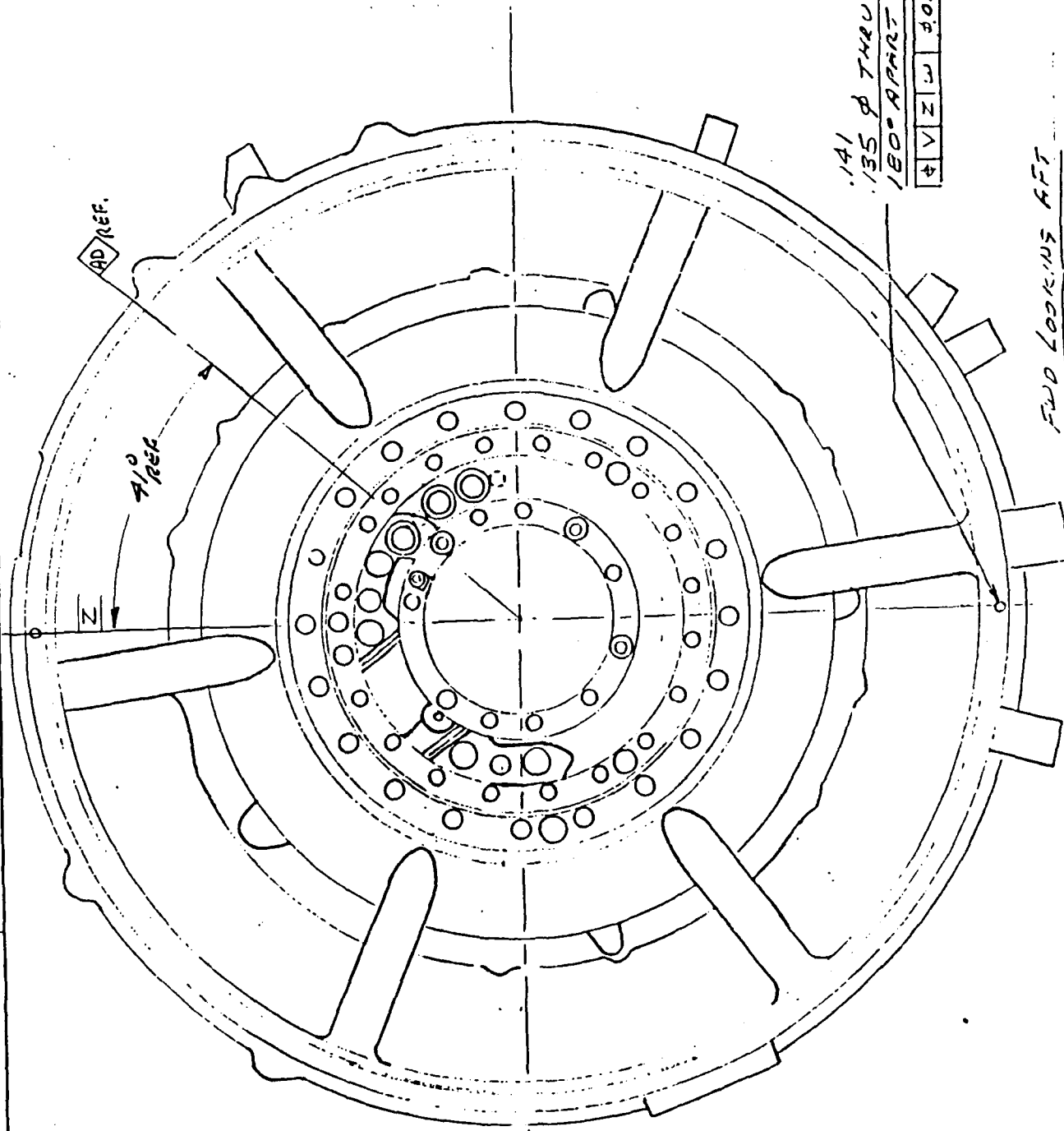
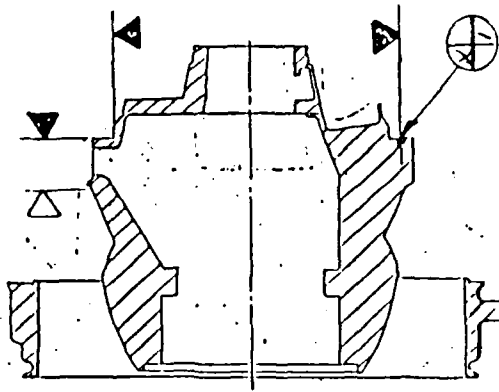
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
DRWG. LOC.	CHARACTERISTIC	Q.C. INFORMATION EQUIPMENT & TECHNIQUE	PAST HIST.	INSP. CODE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE	DATE
1	DR MPS-110	FIXT. E-42414-DG		$\odot$																
2	SHEET #1			$\odot$																
3	SECT. M-M			$\odot$																
4	4.835-4.825	MICRO-HITE		$\odot$																
5	.04-.03 R	RADIUS GAGE		$\odot$																
6	SECT. CU-CU			$\odot$																
7	.05-.03 R	RADIUS GAGE		$\odot$																
8	.627-.631	MICRO-HITE		$\odot$																
9	SECT. AE-AE			$\odot$																
10	W/M .0005	MICRO-HITE		$\odot$																
11	W/M .002 MAX	MICRO-HITE		$\odot$																
12	2.560-2.550 R	"		$\odot$																
13	2.855-2.845 R	"		$\odot$																
14	1.01-.99 R 2 PLC	RADIUS GAGE		$\odot$																
15	27°-21°	FUNCTIONAL GAGE	$\oplus$	$\odot$																
16	37°-37°22"	"	$\oplus$	$\odot$																
17	1.580 MIN	"		$\odot$																
18	.9 APPROX.	"		$\odot$																
19	DIN BT			$\odot$																
20	D-5 1.580 MIN	FUNCTIONAL GAGE	$\oplus$	$\odot$																
21	D-5 .19-.15 R	RADIUS GAGE		$\odot$																
22	D-9 .11-.09	"		$\odot$																

REMARKS ALL CHARACTERISTICS DESIGNATED BY \* TO BE RECORDED.

INSP. APPROVE

T

Part No. 6053T68	Part Name	Job No.
Oper. No. 110	Oper. Description	Work Station
MILL DRILL TAP FWD END		U.O.S.
SKETCH		Locate
		Clamp
		Fixt. E 92414
		Tapes
		Finish
		Dec. .xxx ± .005
		Fillet Rad
		All Dia. W/N
		Break Edges .005



141  
135 Ø THRU 2 HOLES  
180° APART ON A 7780 R  
4 V Z W 2016

FWD LOOKING AFT

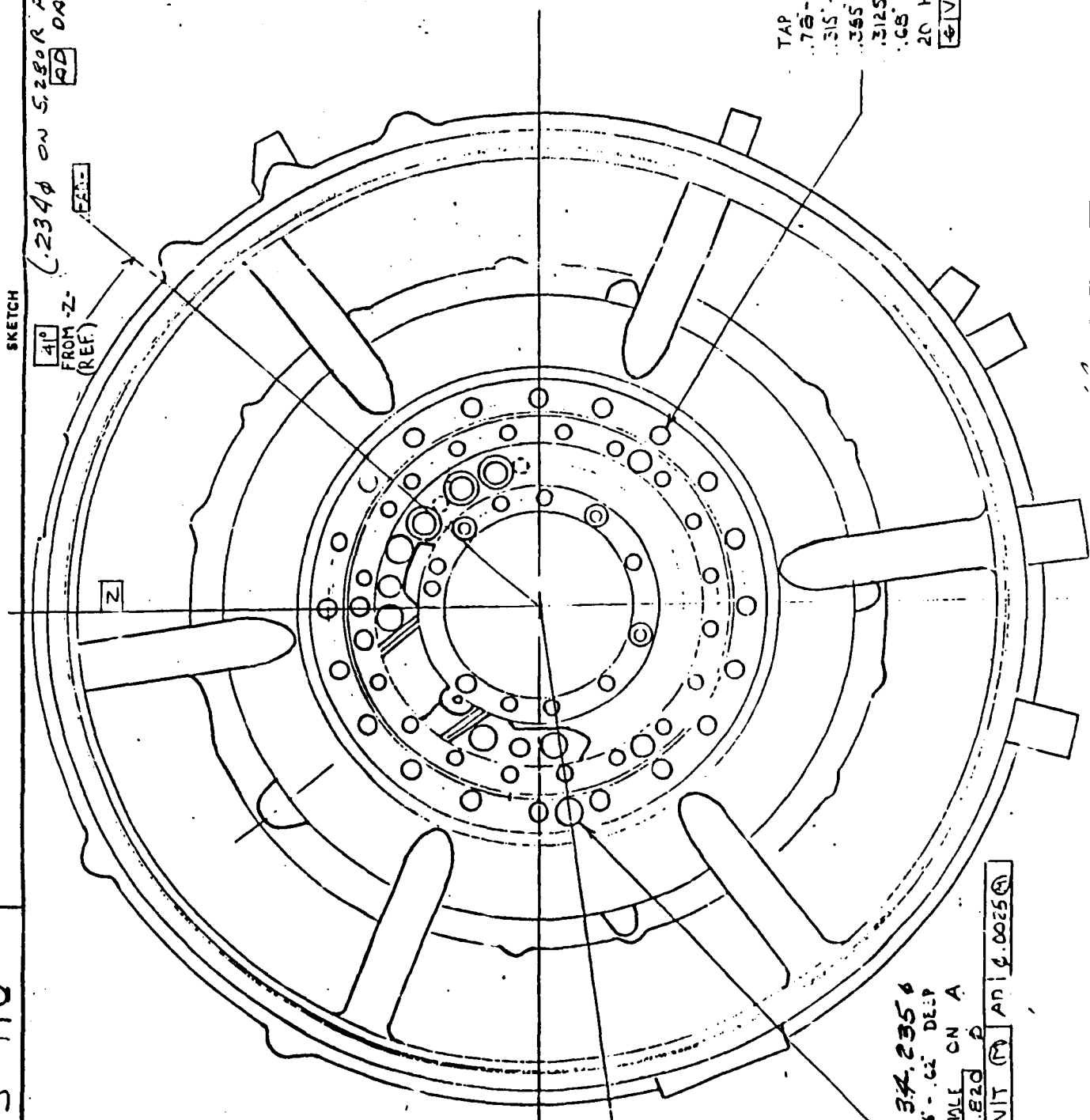
Drawn By	Engineer	Quality	Manufacturing	Released

MPS 110



Part No. 6053 T68 604	Part Name MILL DRILL TAP FWD END	Job No.
Oper. No. 110	Oper. Description	Work Station:
MPS 110		MPS 110
U.O.S.		Locate
Clamp		Fixt E424140
Tapes		Finish
Dec. .xxx ± .005		Fillet Rad
All Dia. W/N		Break Edges

(.2346 ON S.280R FARSIDE)  
 (23 DATUM REF.)



TAP DRILL .2670 - .2754' Ø  
 .75 - .82" TO DRILL POINT  
 .315 - .322" CORE .15 - .17" DEEP  
 .355 - .395" Ø .60 - .100" CSK  
 .3125 - .24 UNF - 28 MIL - S-7742  
 .68" MIN FULL THD. DEPTH.  
 20 HOLES EQ. SPACED ON 6.820 Ø

234.2356  
 .56 - .62" DEEP  
 1 HOLE ON A  
 3.820 Ø  
 4 VIT (7) AD 4.0025 (6)

99°  
 FROM  
 Z-

4 VIT (7) AD 4.0025 (6)

MPS 110

Part No. 6053T63 G04  
Oper. No. 110

Oper. Description

Part Name

ET FRAME

MILL DRILL & TAP FWD END

Work Station

Job No.

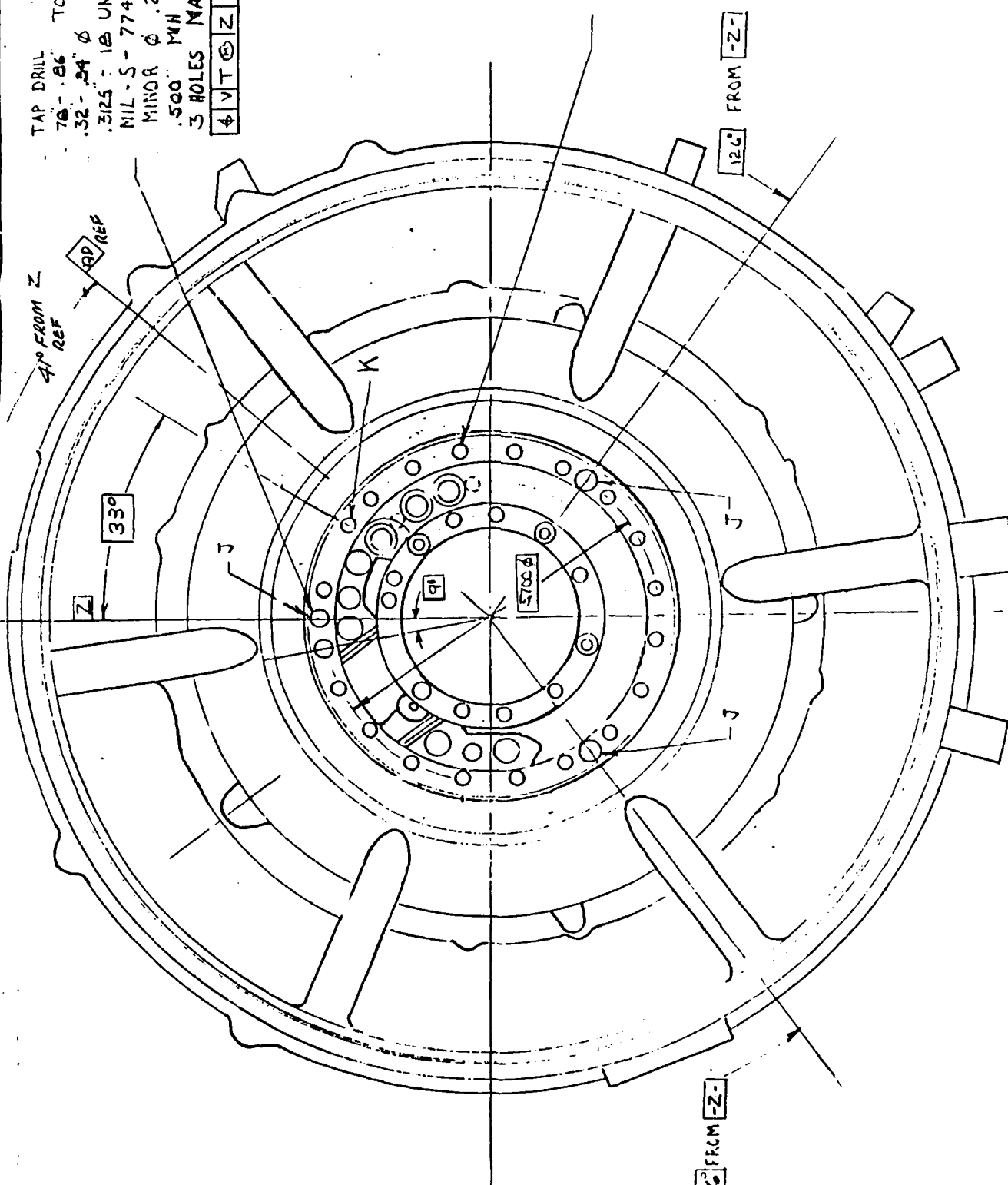
MPS-110

SKETCH

TAP DRILL FROM SURF - AM -  
70° - .86" TO DRILL POINT  
32° - .34" Ø 80° - 100' C/SNK  
3125 - 1B UNC - 3B MCD  
MIL - S - 7742  
MINOR Ø .271" - 276 MCD.  
500 MIN FULL THD DEPTH  
3 HOLES MARKED "J"

4 VIT @ Z 2010 65

U.O.S.
Locate
Clamp
Fixt E 42414
Tapes
Finish V3
Dec. .xxx ± .005
Fillet Rad
All Dia W/N
Break Edges .00



TAP DRILL 2670 - .2754 Ø  
FROM SURF - AM - 78° - 86°  
TO DRILL POINT  
315 - 322 C/BORE 15° - 17° DEEP  
385 - 395 Ø 80° - 100' C/SK  
3125 - 240NF - 3B MIL - S - 7742  
68° MIN FULL THD DEPTH FROM  
20 HOLES EQ SPACED EXCEPT  
ONE HOLE MARKED K  
4 VIT @ Z 2010 65

Engineer: [Signature] Date: [Blank] Part No. 6053T63 G04 Oper. No. 110



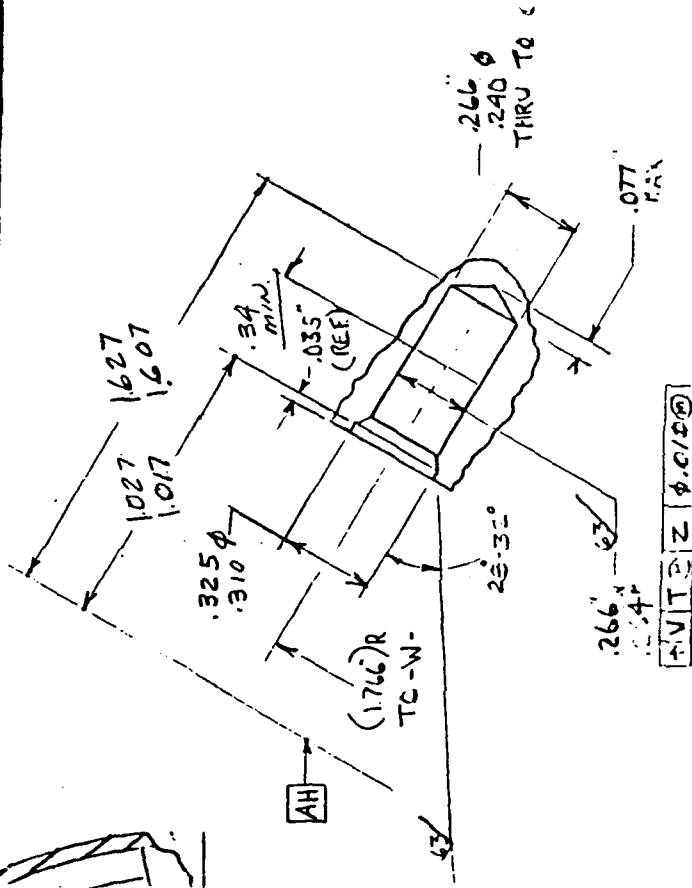
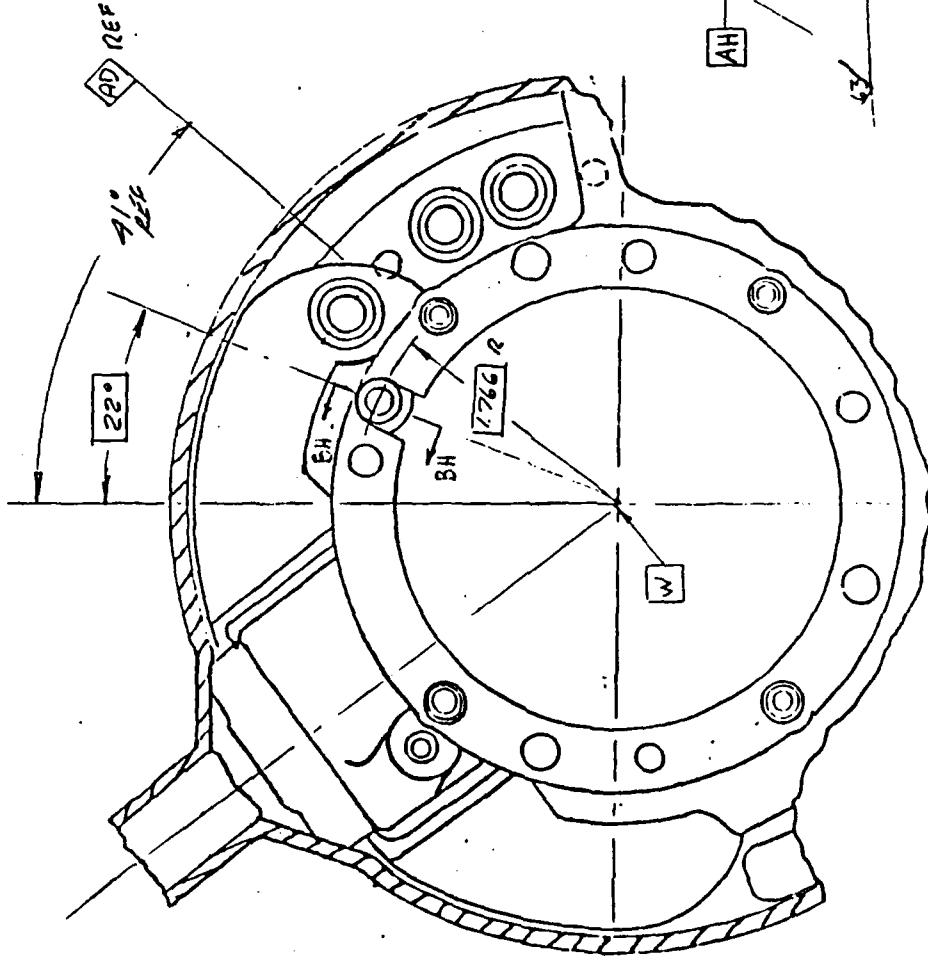
UUN

Part No. 605110	604	Part Name	SECT FRAME	Job No.
Order No. 110	Oper. Description	MILL DRILL & TAP	FWD END	Work Station

MPS 110

MPS 110 SHT OF

Locate	U.O.S.
Clamp	
Fixt	E42414 DC
Tapes	
Finish	
Dec	.xxx ± .005
Fillet Rad	
All Dia. W/N	
Break Edges	• 00S



SECT BH - BH 1735

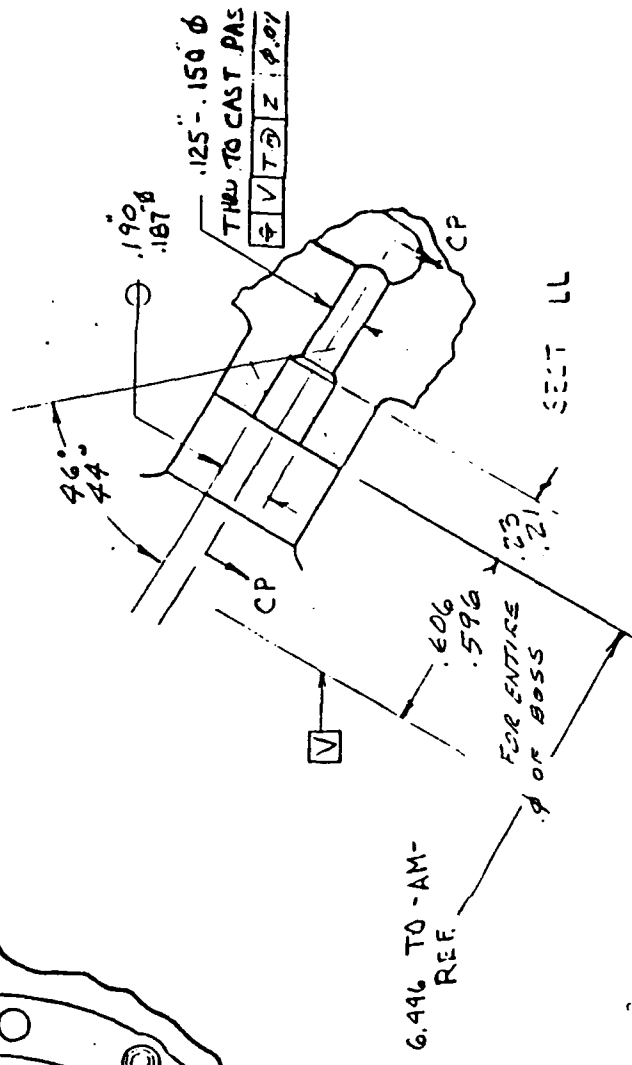
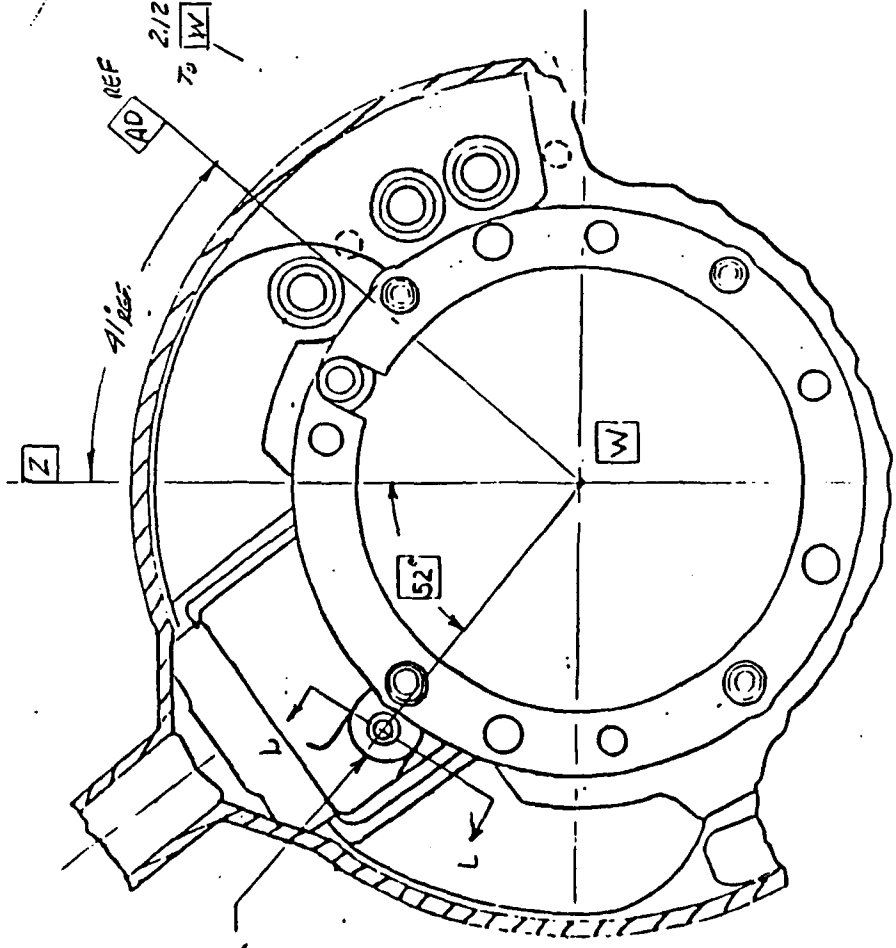
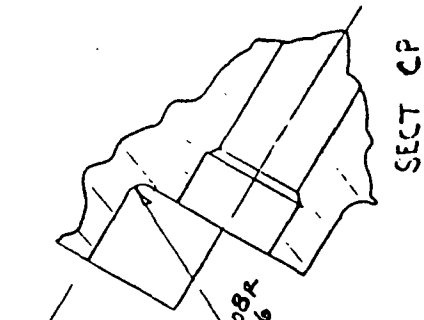
Drawn By	Checked By	Engineer	U - 1P - 81	Quality	Manufacturing	Released
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T

U.S. AIR FORCE

Part No. 605125 604	Part Name ET FRAISE	Job No.
Over. No. 110	Over. Description MILL DRILL & TAP FWD END	Work Station
MPS 110		
MPS-110 SHT OF		

Locate	U.O.S.
Clamp	
Fixt	E 42414D
Tools	
Finish	P3
Dec	.xxx ± .005
Fillet Rad	
All Dia	W/N
Break Edges	.015



Drawn by	Checked by	Engineer	Inspector	Quantity	Part Name	Job No.
					ET FRAISE	

PROCESS SHEET

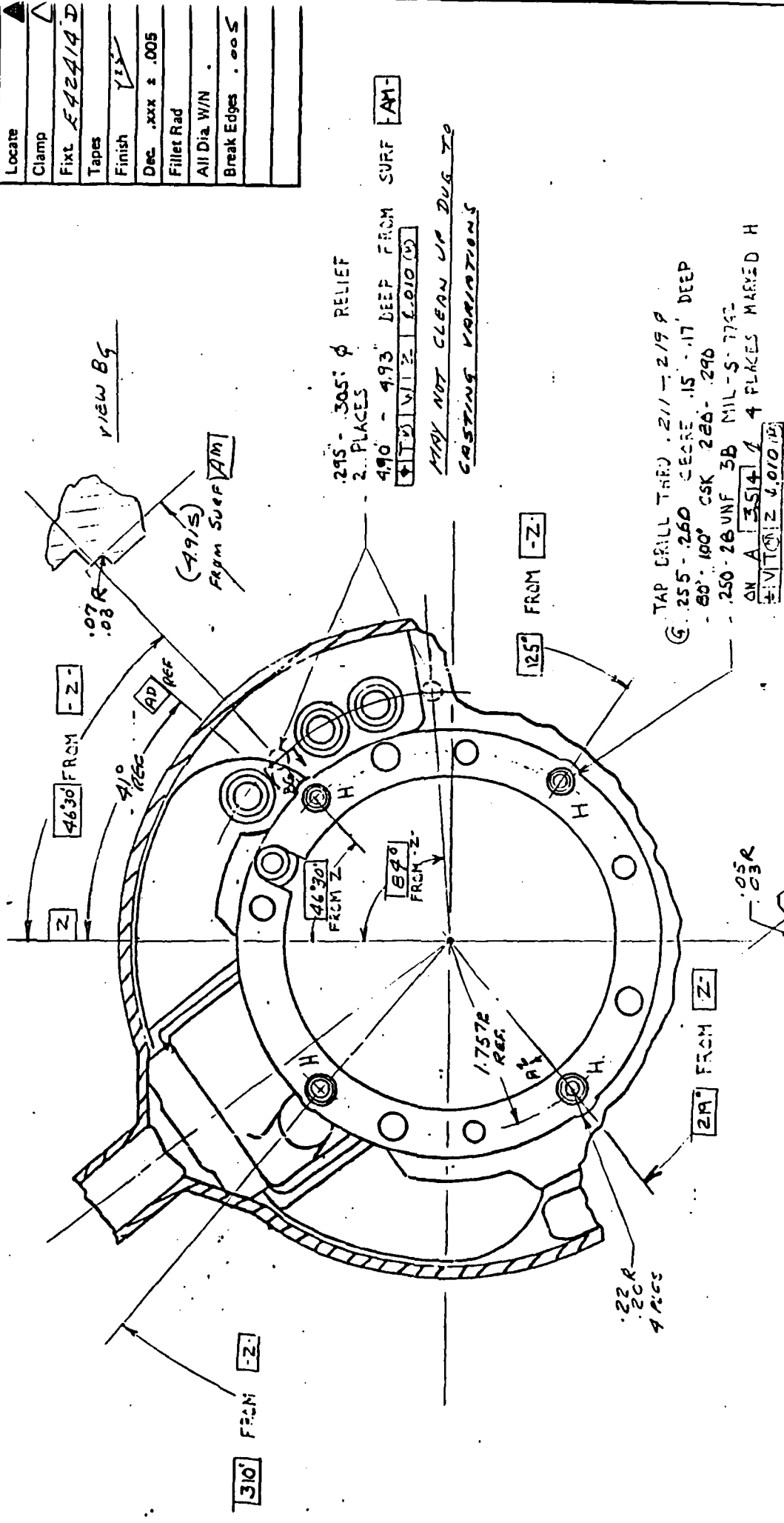


Part No. 6051TCE 604 | Part Name LET FRAME | Job No. | Work Station |

IPS 110 | Oper. No. 110 | Oper. Description MILL DRILL & TAP FWD END |

Sketch

Locate	U.O.S.
Clamp	
Fixt. E42414D	
Tapes	
Finish	Y.S.
Dec. .xxx ± .005	
Fillet Rad	
All Dia W/N	
Break Edges .005	



Manufacturing 11/1/61 | Quality 11/1/61 | Released 11/1/61



Part No. 6053768-604

**Print Name**

LET F&AHE

1PS 110

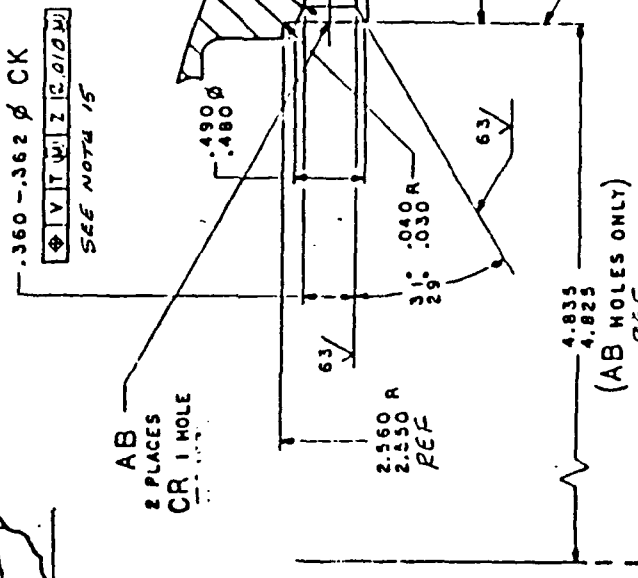
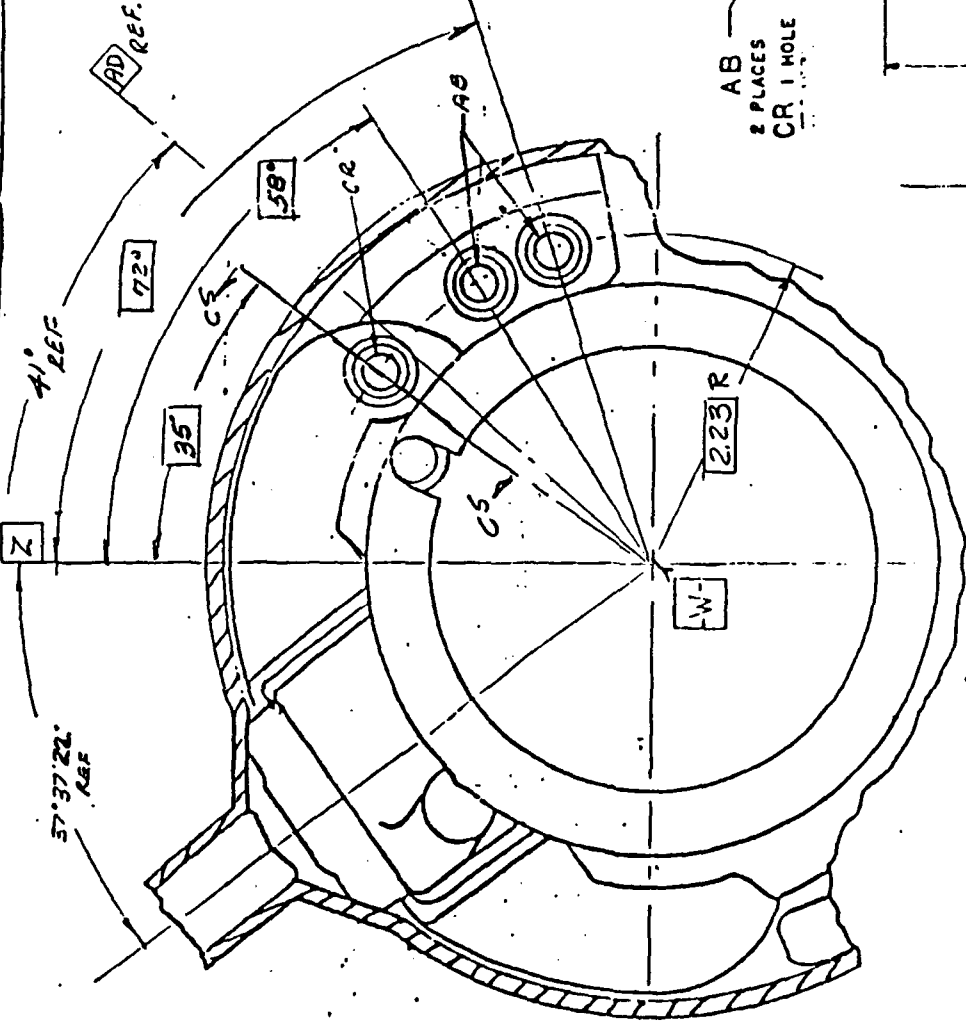
Oper. No.	Oper. Description
110	

Oper. No.	Oper. Description	MILL	DRILL	& TAP	FWD	END
110						

## SKETCH

711-9644

U. O. S.	
Locate	▲
Clamp	△
Fixt	E 424 / 4 Dc
Tapes	
Finish	
Dec. xxx	± .005
Fillet Rad	
All Dia. W/N	.
Break Edges	.



3-400 MIN. LENGTH OF DIA. CK FROM SURF. CF  
IS REQUIRED IF DIA. CK DOES NOT CLEAN UP  
BECAUSE OF CASTING ABNORMALS.

567 CS.CS. ROT-10

NAME	DATE	EMPLOYEE	QUALITY	MANUFACTURING	RELEASED
...	...	...	...	...	...





# PERCENT OF OTHER WORKLOAD FOR RCC

(80/20 LISTING)

RCCs

JOB TYPES	MANPGP	MANPGW	MANPNA	MANPRA	MANPRB	MANPRC	MANPWW
TEMPORARY	13.72	2.35	15.11	1.40	1.05	1.35	1.05
MANUFACTURE	0.00	1.00	0.92	0.00	4.51	2.74	12.50
PDM	1.00	0.00	22.79	0.04	0.07	4.39	22.44
ARMAMENT	0.00	0.23	1.26	0.04	0.03	4.18	2.38
HYDRAULICS	0.00	0.05	7.00	1.11	2.67	3.88	13.99

## *MATERIAL HANDLING*

*IN MANPRA AND MANPRB, THE PRODUCT OR MATERIAL IS BROUGHT INTO THE HOLDING AREA BY ONE OF THE FOLLOW METHODS.*

- 1. THE OVERHEAD CONVEYOR SYSTEM*
- 2. FORK LIFTS*
- 3. BEING PUSHED THERE ON CARTS*

*THE HOLDING AREA IS BETTER KNOWN AS THE WALL.*

*ONCE THE PARTS ARE IN THE HOLDING AREA, THE FOREMAN AND OR A WORKER TAKE THE HOT SHEET WHICH IS FURNISHED BY THE SCHEDULER EACH WEEK TO THE FOREMEN AND GO OUT TO THE WALL. THERE THEY DECIDE WHAT PART NEED TO BE WORKED ON AND COMPLETED AND WHAT THE PRIORITY IS FOR THOSE PARTS.*

*WHEN A MECHANIC HAS FINISHED HIS PRESENT JOB AND HE HAS CHECKED IT TO INSURE THAT IT IS UP TO SPECIFICATIONS, HE THEN TAKES THE PART OUT TO THE WALL. THE PART IS THEN ROUTED TO THE NEXT STATION. THE MECHANIC THEN GOES OVER AND SELECTS HIS NEXT WORK PIECE. HE THEN RETURNS TO HIS WORK STATION WITH THE PART.*

### *COMMENT:*

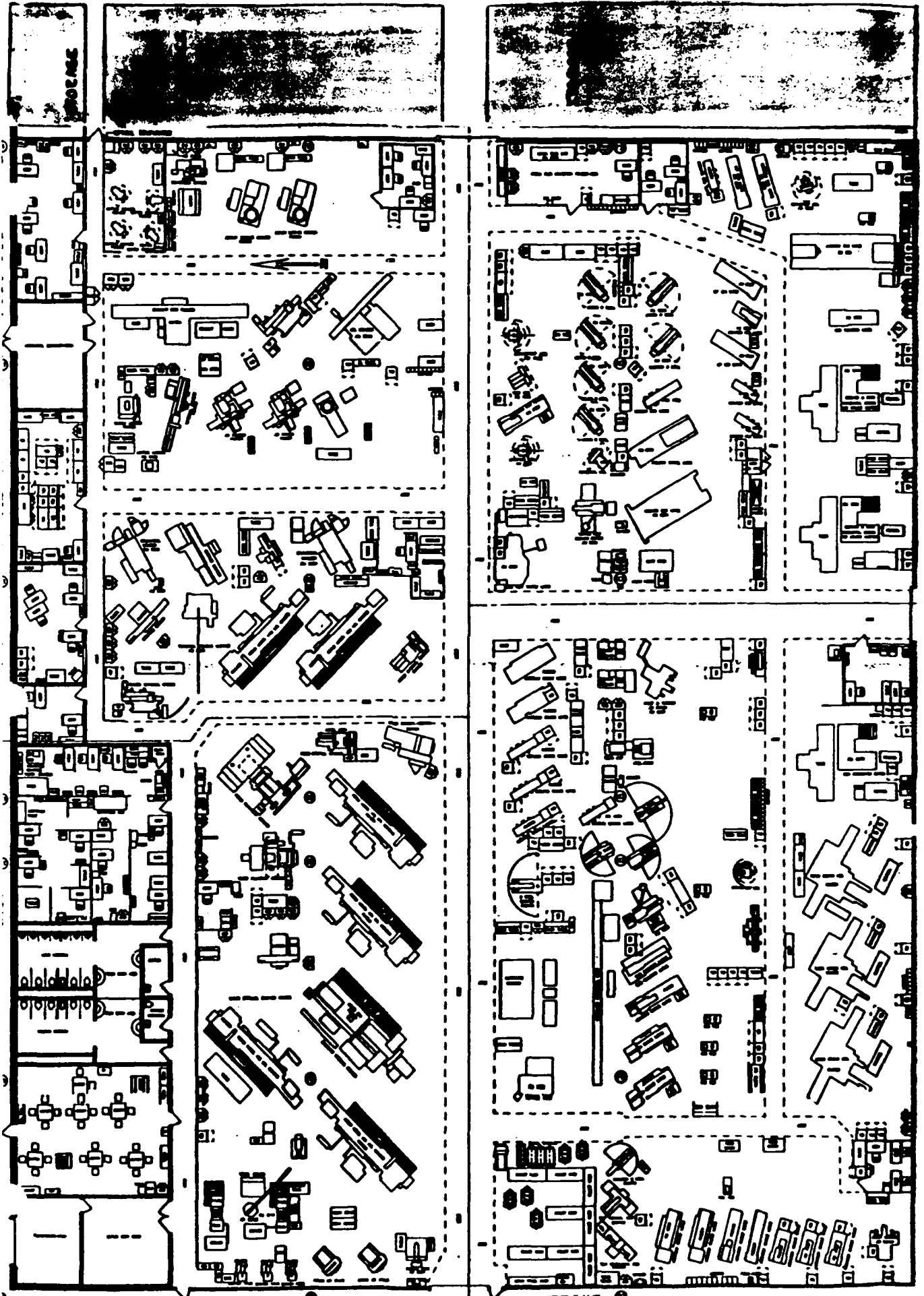
*I FEEL THAT A MATERIAL HANDLER SHOULD BE IN CHARGE OF MOVING THE PARTS TO AND FROM THE WALL TO THE MECHANICS. LET THE EMPLOYEES PREFORM THE TASK THAT THEY ARE ASSIGNED TO. THIS WOULD ALSO INSURE THAT ALL OF THE HARD JOBS WOULD GET SPREAD AROUND.*

## STORAGE

THE STORAGE AREA FOR MANPRA & MANPRG IS LOCATED JUST OUTSIDE THE MACHINE SHOP ON THE EAST SIDE. IT IS THE AREA BETWEEN THE MACHINE SHOP AND THE ASILE. AT THE PRESENT TIME THE MACHINE / GRINDING SHOPS SEEM TO BE A BOTTLE NECK.

THEREFORE THE PARTS KEEP CREEPING OUT TOWARDS AND INTO THE ASILE. WHEN THE BECOMES MANY PART IN THEIR STORAGE AREA THE TURN ON SOME OVER TIME TO REDUCE THE SIZE OF THE QUEUE. COMMENT I FEEL THAT IF THE PARTS WERE FLOWING SMOOTHLY THROUGH THIS AREA THE PRESENT STORAGE FACILITY WOULD BE ADEQUATE.

aisle

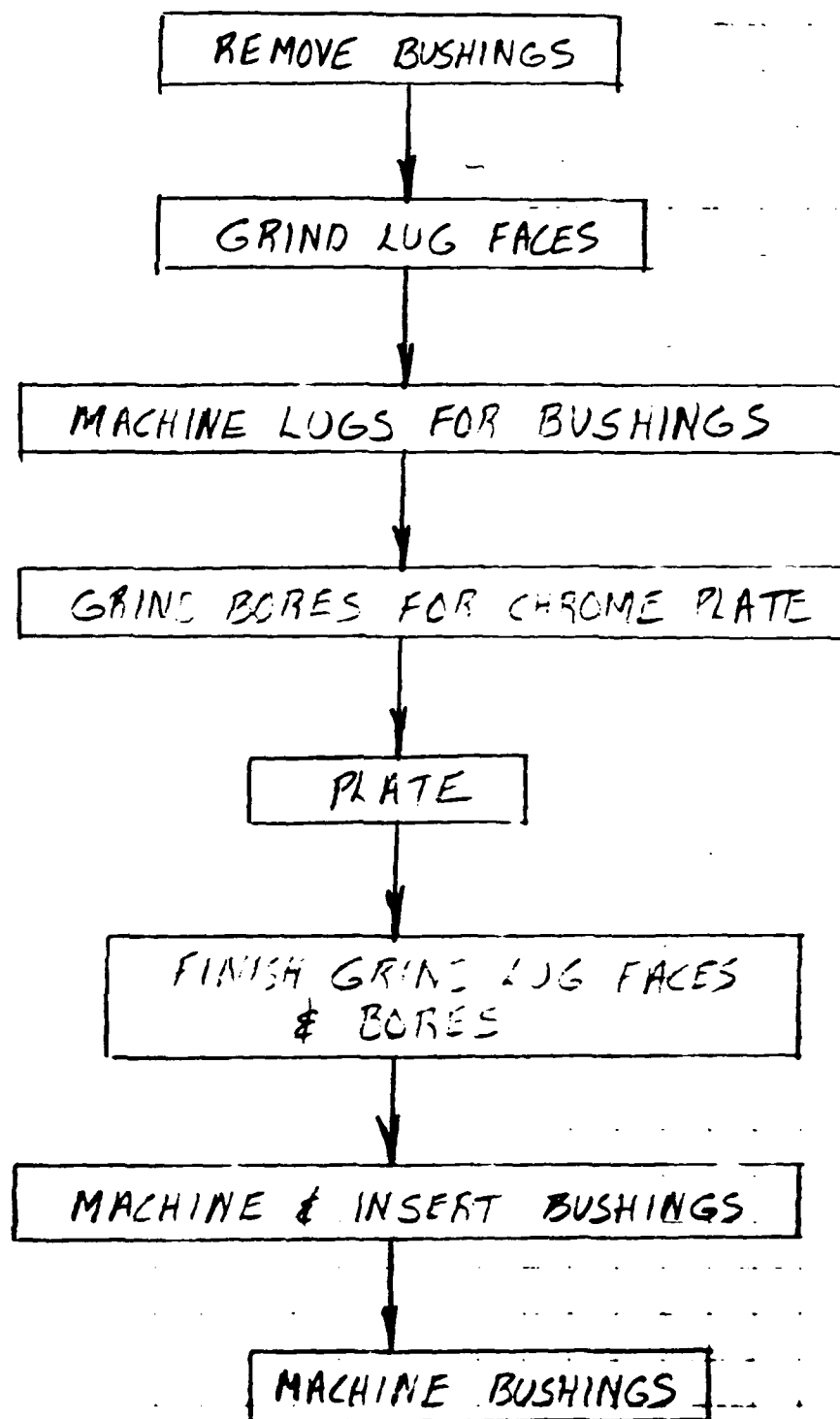


The following section contains generic flow charts of brakes, gear, & wheels as those parts flow through the machine shop & grinding areas.

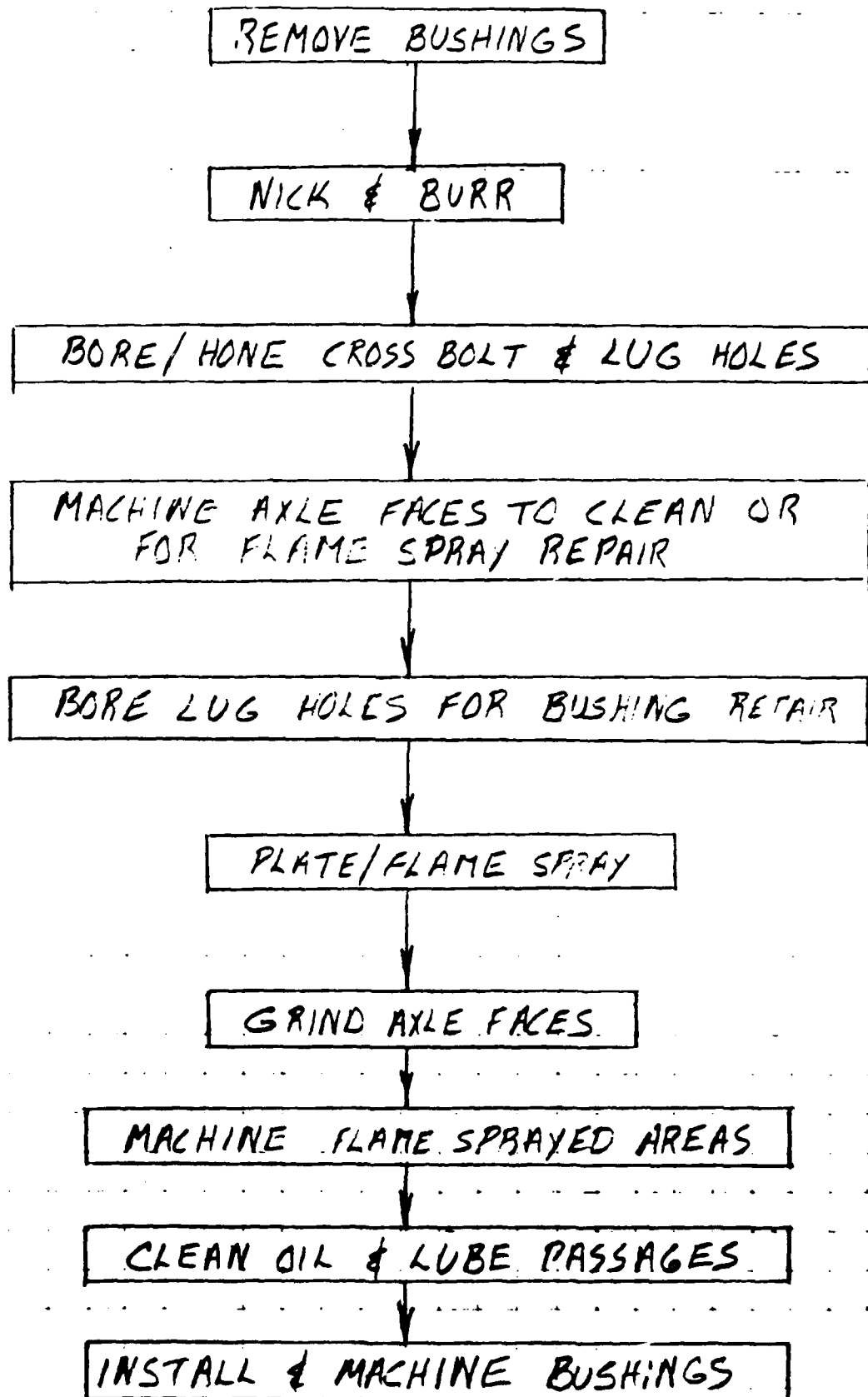
The parts chosen were selected only because they were the most conspicuous in their areas of the R.C.C.

The operations performed on these parts are generally representative of the type & sequence of work that is required on other similar type parts (ie. brakes, wheels & gear).

KC-135 N.L.G.  
OUTER CYLINDER

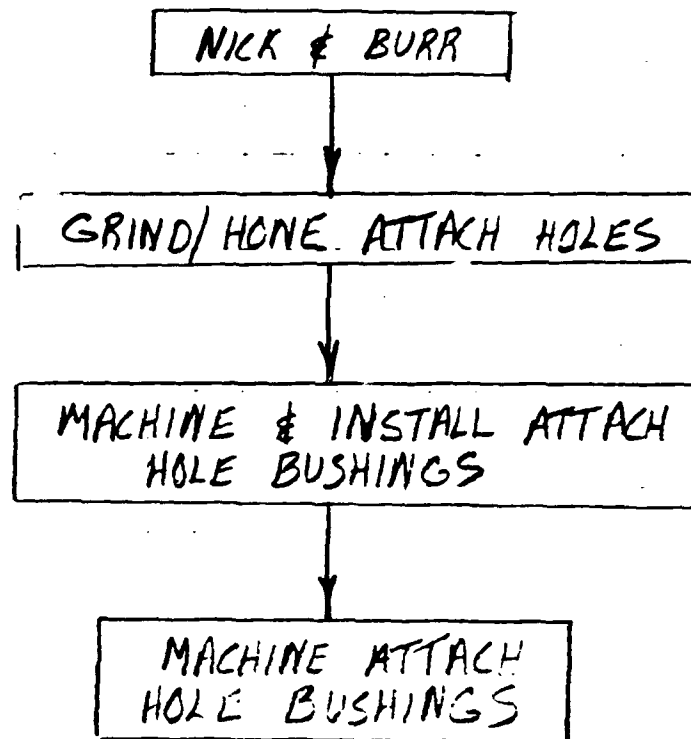


C-141 M. G.  
BOGIE BEAMS

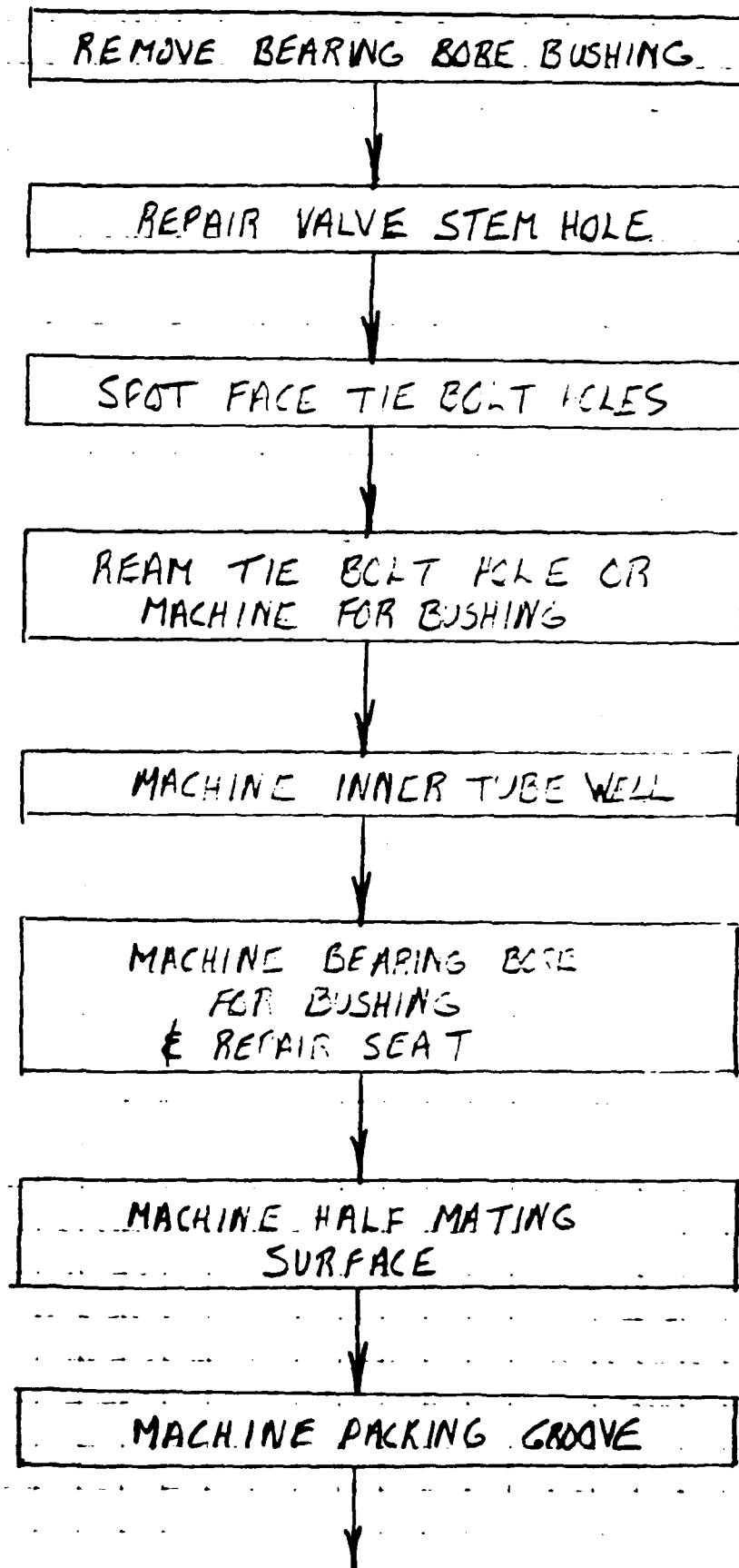




C-141 M.L.G.  
LOWER DRAG BRACE



KC-135 MAIN  
WHEEL HALF OUTER

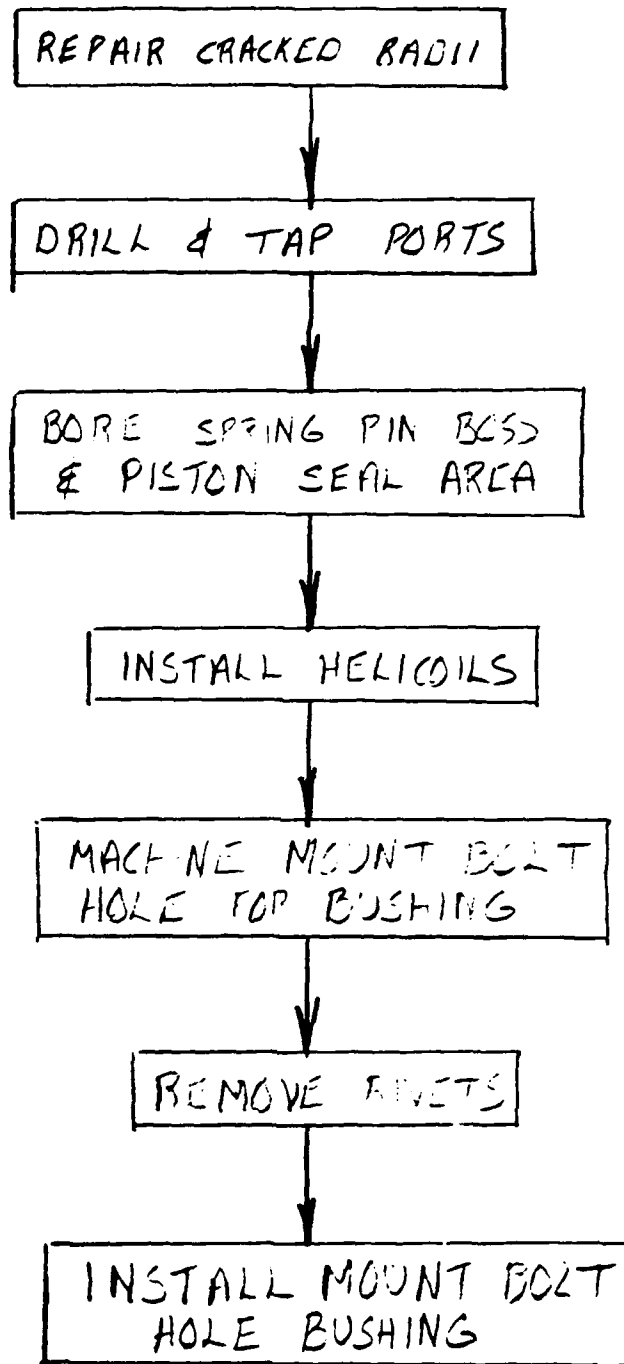


INSTALL TIE BOLT HOLE  
BUSHING

PRESS NEW CUP INTO  
BUSHING

MACHINE & INSTALL  
BUSHING

# KC-135 BRAKE



The following section contains ~~the~~ flow charts for the machine shop & grinding operations performed on the disassembled wheels.

The wheels chosen for characterization herein are considered to be representative of a particular wheel type. The particular wheels charted were selected by A.F. & M.D.C. personnel at a meeting whose results are detailed in Jack Schneider's Engr. Notes.

The wheel groups to be characterized & the type ~~group~~ they represent are as follows:

KC-135 Nose	Magnesium
B-52 Main	Alum. - large
KC-135 Main	Alum. - medium
Δ * T-38 Nose	Alum. - small
C-5 Main	special } Alum. - large bores { Alum. - small
C-5 Nose	

Process flow information was pulled from the appropriate WCD whose number is listed on the last page of each individual flow chart along with the operation numbers represented by the flow chart

\* T-38 & F-5 nose gear are identical for the scope of this work

Δ T-38 & F-5 nose wheels are replaced rather than repaired and consequently have been dropped from flow charted.

G-5A- NOSE WHEEL  
HALF - INNER

BEARING BORE  
REPAIR

INSTALL CUP IN  
BEARING BORE  
BUSHING

MACHINE O.D. OF  
BUSHING & CUP  
ASSY'

INSTALL BUSHING  
& CUP ASSY' INTO  
BEARING BORE

CSA NOSE WHEEL  
HALF - OUTER

MACHINE VALVE  
STEM HOLE

BEARING BORE  
REPAIR

INSTALL CUP  
INTO BEARING  
BORE

MACHINE OD OF  
BUSHING & CUP  
ASSY

INSTALL BUSHING  
& CUP ASSY

C-5 MAIN WHEEL  
HALF - INNER

REMOVE BROKEN  
SCREWS

LOCAL POLISH OR  
MACHINE AT BASE  
OF DRIVE KEY BOSS

REMOVE HELICOILS

RETAINER GROOVE  
REPAIR

BEARING BORE  
REPAIR - INBOARD

BEARING BORE SEAT  
REPAIR - INBOARD

BEARING & SEAL  
GROOVE REPAIR

INSTALL CUP INTO  
BEARING BORE  
BUSHING - 1ST REPAIR

MACHINE O.D. OF  
BUSHING & CUP  
ASSY - 1ST REPAIR



↓

INSTALL CUP &  
BUSHING ASSY INTO  
BEARING BORE -  
1ST REPAIR

↓

INSTALL CUP  
INTO BEARING BORE  
& SEAL BUSHING -  
2ND REPAIR

↓

MACHINE O.D. OF  
BUSHING & CUP  
ASSY - 2ND REPAIR

↓

INSTALL CUP &  
BUSHING ASSY INTO  
BEARING BORE -  
2ND REPAIR

↓

INSTALL HELICOILS

C-5 MAIN WHEEL  
HALF - OUTER

THREADED INSERT  
REPAIR

REMOVE BROKEN  
SCREWS

SAFETY VALVE HOLE  
REPAIR

VALVE STEM HOLE  
REPAIR

BEARING BORE  
REPAIR

BEARING BORE  
SEAT REPAIR

INSTALL CUP INTO  
BEARING BORE

MACHINE O.D. OF  
BUSHING & CUP  
1ST REPAIR

INSTALL BUSHING  
& CUP ASSY INTO  
BEARING BORE

↓

INSTALL CUP INTO  
BEARING BORE &  
SEAL BUSHING -  
2ND REPAIR

↓

MACHINE OD. OF  
BUSHING & CUP  
ASSY' - 2ND REPAIR

↓

INSTALL BUSHING  
& CUP ASSY' INTO  
BEARING BORE -  
2ND REPAIR

↓

INSTALL INSERTS

KC-135 NOSE WHEEL  
HALF - OUTBOARD

METAL SET IAW TC.

REAM TIE BOLT HOLES

MACHINE MATING SURFACE  
& O-RING SEALING  
SURFACE

BEARING BORE REPAIR -  
OUTBOARD

BEARING BORE SEAT  
REPAIR - OUTBOARD

TIE BOLT HOLE REPAIR

VALVE STEM HOLE REPAIR

INSTALL CUP INTO BEARING  
BORE BUSHING

MACHINE O.D. OF BUSHING  
& CUP ASSY

↓

INSTALL BUSHING &  
CUP ASSY INTO  
BEARING BORE

↓

INSTALL THE BOLT  
HOLE BUSHING

KC-135 NOSE WHEEL  
HALF - INBOARD

METAL SET JAW TO

REAM THE BOLT HOLES

MACHINE MATING SURFACE  
& O-RING SEALING  
SURFACE

BEARING BORE REPAIR -  
OUTBOARD

BEARING SURFACE  
REPAIR - INBOARD

THE BOLT HOLE BORES

BEARING BORE & LOCK  
RING GROOVE REPAIR -  
INBOARD

INSTALL CUP INTO  
BEARING BORE  
BUSHING

MACHINE O.D. OF  
BUSHING & CUP ASSY

INSTALL BUSHING &  
CUP ASSY INTO  
BEARING BORE

INSTALL CUP INTO  
BEARING BORE &  
LOCK RING BUSHING

MACHINE OD OF  
BUSHING & CUP  
ASSY

INSTALL BUSHING &  
CUP ASSY INTO  
PUMP HOUSING

INSTALL THE PUMP  
FLANGE

KC-135 MAIN WHEEL  
HALF - OUT BOARD

REMOVE BEARING BORE  
BUSHING

VALVE STEM HOLE  
REPAIR

SPOT FACE TIE  
BOLT HOLES

TIE BOLT HOLE  
REPAIR

TIE BOLT HOLE  
2ND REPAIR  
MACHINE FOR  
BUSHING

MACHINE INNER TUBE  
WELL

BEARING BORE  
REPAIR

BEARING BORE SEAT  
REPAIR



MACHINE MATING  
SURFACE

PACKING GROOVE  
REPAIR

INSTALL TIE BOLT  
HOLE BUSHING

INSTALL CUP INTO  
BEARING BORE  
BUSHING

MACHINE O.D. OF  
BUSHING & CUP  
ASSY

INSTALL BUSHING &  
CUP ASSY INTO  
BEARING BORE

KC-135 MAIN WHEEL  
HALF - INBOARD

REMOVE BEARING BORE  
BUSHING

REMOVE SHANK HOLE  
BUSHING

DRIVE KEY BOLT  
HOLE REPAIR

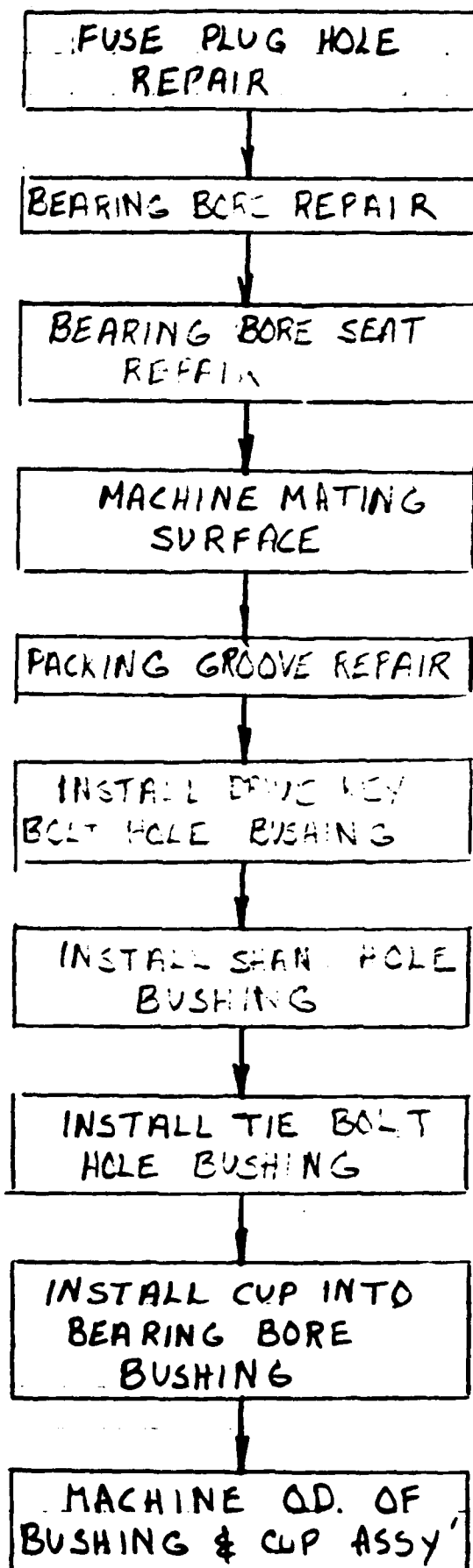
SHANK HOLE REPAIR

SPOT FACE BOLT  
HEADS

TIE BOLT HOLE  
REPAIR

TIE BOLT HOLE  
2ND REPAIR  
MACHINE FOR  
BUSHING

MACHINE INNER  
TUBE WELL



INSTALL BUSHING &  
CUP ASSY INTO BEARING  
BORE

B-52 MAIN WHEEL  
HALF - OUTBOARD

REMOVE BEARING  
BORE BUSHING

TIE BOLT FACE  
REPAIR COUNTER  
BORE FACE

TIE BOLT HOLE  
1ST REPAIR

TIE BOLT HOLE  
2ND REPAIR

MACHINE MATING  
SURFACE

BEARING BORE  
REPAIR - OUTBOARD

VALVE STEM HOLE  
REPAIR

BEARING BORE  
SEAT REPAIR - OUTBOARD

INSTALL TIE BOLT  
BUSHING - 1ST REPAIR

MANUFACTURE TIE  
BOLT HOLE  
BUSHINGS - 2ND REPAIR

INSTALL TIE BOLT  
HOLE BUSHINGS  
2ND REPAIR

INSTALL CUP INTO  
BEARING BORE  
BUSHING

MACHINE O.D. OF  
BUSHING & CUP  
ASSY'

INSTALL BUSHING  
& CUP ASSY' INTO  
BEARING BORE

INSTALL CUP INTO  
BEARING BORE &  
LOCK RING BUSHING

MACHINE O.D. OF  
BUSHING & CUP  
ASSY'

INSTALL BUSHING &  
CUP ASSY INTO  
BEARING BORE

INSTALL HELICOIL

B-52 MAIN WHEEL  
HALF - INBOARD

REMOVE DRIVE KEY  
INDEX BUSHINGS

REMOVE BEARING  
BORE BUSHING

FUSE PLUG HOLE  
REPAIR - INBOARD

MACHINE MATING  
SURFACE

TIE BOLT HOLE  
BOSS FACE REPAIR

TIE BOLT HOLE  
REPAIR

BEARING BORE  
SEAT REPAIR  
INBOARD

BEARING BORE  
REPAIR - INBOARD



MACHINE KEY BOLT  
HOLES - INBOARD

MACHINE DRIVE KEY  
INDEX HOLES - INBOARD

MACHINE INBOARD  
WHEEL I.D. KEY SEAT

BEARING BORE LOCK  
RING GROOVE REPAIR

CRACKED WHEEL WEIGHT  
HOLE REPAIR

CRACKED TIME COUNTER  
HOLE REPAIR

INSTALL TIE BOLT  
BUSHINGS - 1ST REPAIR

INSTALL CUP INTO  
BEARING BORE BUSHING

MACHINE O.D. OF  
BUSHING & CUP ASSY

INSTALL BUSHING &  
CUP ASSY' INTO  
BEARING BORE

INSTALL CUP INTO  
BEARING BORE  
LOCK RING BUSHING

MACHINE O.D. OF  
BUSHING & CUP  
ASSY'

INSTALL BUSHING &  
CUP ASSY' INTO  
BEARING BORE

MACHINE KEY BOLT  
HOLE BUSHINGS

MACHINE DRIVE KEY  
INDEX HOLE  
BUSHINGS

INSTALL DRIVE KEY  
INDEX HOLE BUSHING

F-4 NOSE  
WHEEL HALF-OUTBOARD

REMOVE BEARING BORE  
BUSHING

BEARING BORE C/S OUTER

TIE BOLT FACE REPAIR

C/S VALVE STEM HOLE &  
REIDENTIFY

INSTALL CUP INTO BEARING  
BORE BUSHING

MACHINE O.D. OF BUSHING &  
CUP ASSY

INSTALL GREASE BAFFLE &  
BUSHING & CUP ASSY

F-4 NOSE  
WHEEL HALF - INBOARD

REMOVE BEARING BORE  
BUSHING

BEARING BORE O/S - INNER

TIE BOLT FACE REPAIR

INSTALL CUP INTO BEARING  
BORE BUSHING

MACHINE O.D. OF BUSHING &  
CUP ASSY

INSTALL GREASE BAFFLE &  
BUSHING & CUP ASSY

The following section contains flow charts for the machine shop & grinding operations performed on the disassembled landing gear struts.

The struts chosen for characterization herein are considered to be representative of a particular strut type. The particular gear charted were selected by A.F. & MDC personnel at a meeting whose results are detailed in Jack Schneider's Engr. Notes.

The strut types to be characterized & the type they represent are as follows:

F-15 MLG	Steel/Steel
C-141 NLG	Steel/Steel
KC-135 MLG	Steel/Steel
F-15 NLG	Alum/Steel
KC-135 NLG	Alum/Steel
B-52 MLG	Alum/Steel

Process flow information was pulled from the appropriate WCD whose number is found on the last page of each individual flow chart along with the operation numbers represented by the flow chart

KC-135 M.L.G.  
ACTUATOR BEAM

BEAM TERMINAL ATTACH  
LUGS

ROLL BURNISH TERMINAL  
ATTACH LUGS

BEAM SUPPORT LINK ATTACH  
LUGS

ROLL BURNISH SUPPORT LINK  
ATTACH LUGS

BEAM HYDRAULIC ACTUATOR  
ATTACH LUGS - 1ST REPAIR

BEAM HYDRAULIC ACTUATOR  
ATTACH LUGS - 2ND REPAIR

ROLL BURNISH HYDRAULIC  
ACTUATOR ATTACH LUGS

STAMP LETTER

MACHINE TERMINAL ATTACH  
LUG BUSHING

INSTALL TERMINAL ATTACH  
LUG BUSHING

MACHINE SUPPORT LINK ATTACH  
LUG BUSHING

INSTALL SUPPORT LINK ATTACH  
LUG BUSHING

MACHINE HYDRAULIC ACTUATOR  
ATTACH LUG BUSHING

INSTALL HYDRAULIC ACTUATOR  
ATTACH LUG BUSHING

MACHINE HYDRAULIC ACTUATOR  
ATTACH LUG BUSHING

INSTALL HYDRAULIC ACTUATOR  
ATTACH LUG BUSHING

KC-135 M.L.G.  
BEAM ASSY'

REMOVE BUSHINGS

BEAM BRAKE EQUALIZER  
ROD ATTACH LUGS

REAM CYLINDER ATTACH  
PIN BOLT HOLES

HONE CYLINDER ATTACH  
LUG

HONE AFT SOCKET

HONE FORWARD SOCKET

STAMP TRUCK BEAM

MACHINE CYLINDER ATTACH  
LUG BUSHING

INSTALL CYLINDER ATTACH  
LUG BUSHING



MACHINE ATTACH PIN  
BOLT HOLE BUSHING

INSTALL ATTACH PIN  
BOLT HOLE BUSHING

MACHINE BRAKE EQUALIZER  
ROD ATTACH LUG BUSHING

INSTALL BRAKE EQUALIZER  
ROD ATTACH LUG BUSHING

FINAL ACCEPTANCE

FINAL VISUAL INSPECTION

KC-135 M.L.G.  
FORWARD AXLE

NKK & BURR

KEYWAY REPAIR

NEW AXLES ONLY - MACHINE  
JOURNAL #3

FIRST GRIND JOURNAL #1  
(CHROME)

FIRST GRIND JOURNAL #2  
(CHROME)

FIRST GRIND JOURNAL #3  
(FLAME SPRAY)

FINISH GRIND JOURNAL #1

FINISH GRIND JOURNAL #2

MACHINE FLAME SPAYED  
JOURNAL #3

FINAL ACCEPTANCE

FINAL PRODUCT VISUAL INSPECTION

KC-135 M.L.G.  
AFT AXLE

REMOVE SLEEVE FROM  
JOURNALS 5 & 6

KEYWAY REPAIR

DRILL AXLES (NEW ONLY)

MACHINE AXLES (NEW ONLY)

FIRST GRIND JOURNAL #1  
(CHROME)

FIRST GRIND JOURNAL #2  
(CHROME)

FIRST GRIND JOURNAL #3  
(CHROME)

FIRST GRIND JOURNAL #4  
(CHROME)

FIRST GRIND JOURNAL #5  
(FLAME SPRAY)

KC-135 M.L.G.  
PISTON ROD

CHECK STRAIGHTNESS

KC-135 M.L.G.  
SUPPORT LINK

APEX LUG 1ST Q/S - REAM

APEX LUG 2ND Q/S - REAM

REAM BASE LUG

MACHINE APEX LUG BUSHING

INSTALL APEX LUG BUSHING

MACHINE BASE LUG BUSHING

INSTALL BASE LUG BUSHING

KC-135 M.L.G  
BRAKE COLLAR

MACHINE AXLE LUG I.D.

MACHINE EQUALIZER ROD  
LUG

MACHINE I.D. BUSHING

INSTALL I.D. BUSHING

MACHINE LUG BUSHING

INSTALL LUG BUSHING

FIRST GRIND JOURNAL  
#6 (FLAME SPAY)

FIRST GRIND JOURNAL  
#7

FIRST GRIND JOURNAL #8  
(CHROME)

FIRST GRIND JOURNAL #9  
(CHROME)

FIRST GRIND JOURNAL #10  
(CHROME)

FINISH GRIND JOURNAL #1

FINISH GRIND JOURNAL #2

FINISH GRIND JOURNAL #3

FINISH GRIND JOURNAL #4

FINISH GRIND JOURNAL #5

FINISH GRIND JOURNAL #6

FINISH GRIND JOURNAL #9

FINISH GRIND JOURNAL #10

FINISH GRIND JOURNAL #1

FINISH GRIND JOURNAL #2

FINISH GRIND JOURNAL #3

FINISH GRIND JOURNAL #4

FINISH GRIND JOURNAL #7

FINISH GRIND JOURNAL #8

FINISH GRIND JOURNAL #9

FINISH GRIND JOURNAL #10

MACHINE FLAME SPAY  
JOURNAL #5

POLISH JOURNAL #5



MACHINE FLAME SPRAY  
JOURNAL #6

POLISH JOURNAL #6

INSTALL AXLE

FINAL ACCEPTANCE

FINAL INSPECTION

KC-135 M.I.G.  
LOWER SIDE SEGMENT

REMOVE BUSHINGS

REAM UPPER STRUT HOLE  
1ST Q/S

REAM UPPER STRUT HOLE  
2ND Q/S

ROLL BURNISH UNIVERSAL  
STRUT HOLE

ROLL BURNISH INTERMEDIATE  
& LIGHTENING HOLES

MACHINE UPPER HOLE  
BUSHINGS

INSTALL UPPER HOLE  
BUSHINGS

MACHINE UNIVERSAL  
HOLE BUSHING

INSTALL UNIVERSAL  
HOLE BUSHING

KC-135 M.L.G  
TORSION LINK

MACHINE REAR LUG HOLE I.D.

MACHINE APEX LUG HOLES

CLEAN ALL LUBE & OIL  
PASSAGES

INSTALL APEX LUG BUSHINGS

MANUFACTURE APEX LUG BUSHING  
O/S

INSTALL O/S APEX LUG BUSHING

INSTALL REAR LUG BUSHINGS

MANUFACTURE REAR LUG  
BUSHINGS O/S

INSTALL O/S REAR LUG  
BUSHINGS

KC-135 M.L.G.  
CK ASSY - MISC. (STL.)

FINAL ACCEPTANCE

FINAL INSPECTION

RC-135 M. L. G.  
CK. ASSY - MISC. (ALUM.)

FINAL ACCEPTANCE

FINAL INSPECTION

KC-135 M.L.G.  
MAIN OLEO TRUNNION - RISK  
ALUM CAT. A-3

FINAL ACCEPTANCE

FINAL INSPECTION

KC-135 M.L.G.  
MAIN OLEO TRUNNION  
MISC. (STL.) (AT. S-11)

FINAL ACCEPTANCE

FINAL INSPECTION

KC-135 M.L.G.  
TRUCK ASSY'

MATCH - UP

INSTALL FORWARD AXLE

MACHINE FWD AXLE CROSS  
PIN HOLES

INSTALL AFT AXLES

MACHINE AFT AXLE CROSS  
PIN HOLES



KC-135 N.L.G.  
PISTON

NICK & BURR

REPAIR TORQUE ARM BOSS O/S

GRIND INNER CYLINDER

GRIND AXLE JOURNAL OUTBOARD  
#1

GRIND AXLE JOURNAL INBOARD  
#2

GRIND AXLE JOURNAL INBOARD  
#3

GRIND AXLE JOURNAL OUTBOARD  
#4

GRIND UPPER BEARING LAND

FINISH GRIND UPPER BEARING  
AREA

FINISH GRIND INNER CYLINDER  
O.D.

FINISH GRIND AXLE JOURNAL  
#1

FINISH GRIND AXLE JOURNAL  
# 2

FINISH GRIND AXLE JOURNAL  
# 3

FINISH GRIND AXLE JOURNAL  
# 4

MACHINE TORQUE ARM BOSS  
FLANGE BUSHING

TORQUE ARM BOSS FLANGE  
BUSHING REPAIR

MACHINE TORQUE ARM BUSHING

INSTALL TORQUE ARM BOSS  
BUSHING

REPLACE SHOULDER  
BLOCKS

KC-135 N.L.G  
GEAR DRAG BRACE PLATE

REWORK SAFETY PIN HOLES

KC-135 N.L.G.  
UPPER OLEO NUT

REMOVE CRACKS FOUND IN CRACKS

KC-135 M.L.G.  
ACTUATOR BRACKET

DRILL & REAM NEW ACTUATOR  
BRACKET

ALODINE REWORK

ACTUATOR ATTACH HOLE SINGLE  
O/S

TRUNNION ATTACH HOLES  
UPPER O/S

TRUNNION ATTACH HOLES  
LOWER O/S

MACHINE ACTUATOR ATTACH  
HOLE BUSHING

ACTUATOR ATTACH HOLE  
SINGLE BUSHING INSTALLATION

MACHINE TRUNNION ATTACH  
HOLE UPPER BUSHING

INSTALL TRUNNION ATTACH  
HOLE UPPER BUSHING

MACHINE TRUNNION ATTACH  
HOLE LOWER BUSHING

INSTALL TRUNNION ATTACH  
HOLE LOWER BUSHING

KC-135 N.L.G.  
TORSION LINK

NICK & BURR

UPPER LINK LUG REPAIR  
Q/S

LOWER LINK LUG REPAIR  
Q/S

MACHINE UPPER LINK  
LUG BUSHINGS

INSTALL UPPER LINK  
LUG BUSHING

MACHINE LOWER LINK  
LUG BUSHING

INSTALL LOWER LINK  
LUG BUSHING

KC-135 N.L.G.  
ARM ASSY.

ROD ATTACH HOLE  
O/S

RECENTER

FIRST GRIND SHAFT LARGE  
O.D.

FIRST GRIND SHAFT SMALL  
O.D.

FINISH GRIND SHAFT SMALL  
O.D.

FINISH GRIND SHAFT LARGE  
O.D.

MACHINE BUSHING ROD ATTACH

INSTALL BUSHINGS IN ROD



KC-135 N.L.G.  
LOWER LINK

NICK & BURR

LOWER END LUG REPAIR  
O/S

MACHINE LOWER END LUG  
BUSHINGS

INSTALL LOWER END LUG  
BUSHINGS

MACHINE BUSHINGS

INSTALL BUSHINGS

KC-135 N.L.G.

UPPER LINK

BLEND WORN AREA

REIDENTIFY

BUSHING REPAIR

CHROME REPAIR

FIRST GRIND ATTACH LUG  
O.D.

FINISH GRIND ATTACH LUG  
O.D.

FINISH GRIND ATTACH LUG

MACHINE BUSHING

INSTALL BUSHING

KC-135 N.L.G.  
STEERING PLATES

MODIFY SUPPORT PLATE

MACHINE RADIUS  
IN SLOT AREA

MACHINE RADIUS

MACHINE SMALL ATTACH  
HOLES

MACHINE BUSHES

INSTALL BUSHING

EDGE BUSHING

KC-135 NLG.  
OLEO CAM - UPPER & LOWER

MODIFY CAM

MODIFY CAM

KC-135 N.L.G.  
OUTER CYLINDER

NICK & BURR

REMOVE BUSHINGS

DRAG BRACE HOLE REPAIR O/S

FIRST REPAIR - TRUNNION BORE

SECOND REPAIR (O/S) - TRUNNION  
BORE

TRUNNION RETAINING PIN HOLE  
REPAIR (O/S)

ROLL BURNISH

ACTUATOR BRACKET HOLE REPAIR  
J (O/S)

DOOR LUG HOLE REPAIR (O/S)

ACTUATOR BRACKET HOLE  
REPAIR K (O/S)

STEERING PLATE LUG HOLE  
REPAIR (VS)

FIRST REPAIR - STEERING  
COLLAR

TOWING COLLAR REPAIR

SECOND REPAIR - STEERING  
COLLAR

SECOND REPAIR - TOWING COLLAR

I.D. REWORK  
LONGITUDINAL DEFECTS

I.D. REWORK  
CIRCUMFERENTIAL DEFECTS

HONE UPPER SEAL AREA BORE

REMOVE IRREGULARITIES

HONE UPPER BEARING BORE  
STD. BORE

HONE UPPER BEARING BORE  
FIRST REPAIR

HONE STD SIZE LOWER  
BEARING BORE

HONE LOWER BEARING BORE  
FIRST REPAIR

MACHINE STEERING COLLAR  
AREA

MACHINE TOWING COLLAR  
AREA

HONE UPPER SEAL BORE

POLISH UPPER SEAL BORE

POLISH UPPER BORE

HONE LOWER BORE

POLISH LOWER BORE

FINAL POLISH UPPER SEAL  
BORE

FINAL POLISH UPPER BORE

FINAL PUSH LOWER  
BAR

BE IDENTIFY

MACHINE DRAG BRAKE BUSHING

INSTALL DRAG BRAKE BUSHING

MACHINE TRUNNION HOLE BUSHING

INSTALL TRUNNION HOLE BUSHING

CENTER DRILL TRUNNION  
RETAINING PIN HOLE

MACHINE TRUNNION RETAINING  
PIN BUSHINGS

MACHINE STEERING PLATE  
LUG BUSHING

INSTALL STEERING plate  
LUG BUSHING

MACHINE ACTUATOR BRACKET  
HOLE BUSHING



MACHINE ACTUATOR BRACKET HOLE  
(T) BUSHING

1823  
INSTALL ACTUATOR BRACKET HOLE  
BUSHING

MACHINE ACTUATOR BRACKET HOLE  
BUSHINGS

INSTALL ACTUATOR BRACKET HOLE  
BUSHINGS

MACHINE DOOR ATTACH LUG BUSHINGS

INSTALL DOOR ATTACH LUG BUSHINGS

INSTALL TRUNNION PINS

REAM TRUNNION PIN LOCK  
SCREW HOLES

MARK & REMOVE TRUNNION  
PIN

INSTALL HELICOILS

KC-BS NLG  
UPPER BEARING

MACHINE O.D.

NICK & BURR

B-52 M.L.G.  
JACKSHAFT STOP

DRILL HOLES IN STOP ASSY

B-52 M.L.G.  
UPPER OLEO BEARING  
RETAINER NVT

MACHINE SPANNER SLOTS

B-52 M.L.G  
CENTERING CAM ASSY

CENTERING CAM KEY  
REPAIR

CENTERING CAM KEY  
REPAIR - RADIUS

ELECTRO ETCH

B-SR M.L.G.  
TORSION LINK ASSY

MACHINE APEX BOSS  
BUSHING

INSTALL APEX BOSS  
BUSHING

B-52 M.L.G. PROJ. IX  
STEERING PLATE ASSY.

DRILL BOTTOM PLATE

MOUNTING BOLT HOLE REPAIR  
N/S

TORQUE ARM LUG HOLE REPAIR  
N/S

NICK & BURR

MACHINE MOUNTING BOLT HOLE  
BUSHING

INSTALL MOUNTING BOLT HOLE  
BUSHING

MOUNTING BOLT HOLE BUSHING  
FINISH I.D.

MACHINE TORQUE ARM LUG  
BUSHING

INSTALL TORQUE ARM LUG  
BUSHING

TORQUE ARM LUG BUSHING  
FINISH I.D.

B-52 M.L.G. 1000  
DRAG STRUT I/B TRIPOD  
LINK

REMOVE BUSHINGS

MACHINE LUG E O/S TO  
CLEANUP

MACHINE LUG F O/S TO  
CLEANUP

MACHINE LUG E BUSHING

INSTALL LUG E BUSHING

REAM LUG E BUSHING

MACHINE LUG F BUSHING

INSTALL LUG F BUSHING

REAM LUG F BUSHING



B-52 M.L.G.  
DRAG STRUT O/B TRIPOD  
LINK

REMOVE BUSHING

LUG A O/S REPAIR

O/S REPAIR LUG B

O/S REPAIR LUG C

O/S REPAIR LUG D

MACHINE LUG E BUSHING  
O.D.

INSTALL LUG B BUSHING

FINISH HONE LUG B BUSHING  
I.D.

MACHINE LUG C BUSHING O.D.

INSTALL LUG C BUSHING

FINISH HONE LUG BUSHING

MACHINE LUG D BUSHING

INSTALL LUG D BUSHING

FINISH HONE LUG D BUSHING

MACHINE LUG A BUSHING

INSTALL LUG A BUSHING

FINISH HONE LUG A BUSHING

LOWER TRIPOD LINK

REMOVE BUSHINGS

MACHINE LUG G Q/S

MACHINE LUG H Q/S

MACHINE LOWER LINK LUG  
G BUSHING

INSTALL LOWER LINK LUG  
G BUSHING

FINISH MACHINE LOWER LINK  
LUG G BUSHING

MACHINE LOWER LINK LUG  
H BUSHING

INSTALL LOWER LINK LUG  
H BUSHING

FINISH MACHINE LOWER  
LINK LUG H BUSHING

8-52 M.L.G.

STEERING BEARING ASSY

REPAIR STEERING BEARING  
HOLE

STEERING BEARING END RADIUS  
& CHAMFER

INSTALL & MATCH DRILL GEAR

B-52 M.L.G.  
CYLINDER ASSY

BRAKE MOUNTING HOLE CRACK  
REPAIR

JACK PAD BOSS REPAIR

WELD SPLATTER REWORK

MODIFY RETAINER NUT HOLES

REPAIR RETAINER NUT LOCK  
BOLT HOLES

DRILL NEW RETAINER NUT  
LOCK BOLT HOLES

TORQUE ARM ATTACH LUG  
O/S REPAIR

TOW LUG HOLE REPAIR  
FIRST O/S

TOW LUG HOLE REPAIR  
FIRST O/S

REPAIR HYDRAULIC  
FITTING HOLES

MACHINE CRACKS IN  
AXLE THREAT AREA

FIRST GRIND PISTON  
OE.

FIRST GRIND AXLE  
JOURNAL #1

FIRST GRIND AXLE  
JOURNAL #2

FIRST GRIND AXLE  
JOURNAL #3

FIRST GRIND AXLE  
JOURNAL #4

INNER CYLINDER  
BORE SEAL REWORK

FIRST GRIND SEAL  
AREA

(LEFT SIDE REPAIR O/S)  
AFT DOOR LEVER LUG  
HOLE

(LEFT SIDE) ROLL BURNISH  
AFT DOOR LEVER LUG  
HOLE

(RIGHT SIDE REPAIR O/S)  
FWD. DOOR LEVER LUG  
HOLE

(FWD. RIGHT SIDE) ROLL  
BURNISH DOOR LEVER  
LUG HOLE

(LEFT SIDE REPAIR O/S)  
FWD. DOOR LEVER LUG  
HOLE

(LEFT SIDE FWD.) ROLL  
BURNISH DOOR LEVER  
LUG HOLE

REPAIR ACTUATOR LUG  
HOLE O/S

ROLL BURNISH ACTUATOR  
LUG HOLE

CENTER ATTACH HOLE  
REPAIR (FIRST REPAIR)

CENTER ATTACH HOLE  
REPAIR (SECOND REPAIR)

MACHINE CENTER CYLINDER  
ATTACH HOLE

MACHINE CENTER ATTACH  
HOLE BUSHING

INSTALL CENTER ATTACH  
HOLE BUSHING

FINISH I.D.

(RIGHT SIDE) MACHINE END  
TRUNNION SOCKET

(RIGHT SIDE) INSTALL END  
TRUNNION SOCKET BUSHING

FINISH BUSHING I.D.

(LEFT SIDE) MACHINE END  
TRUNNION SOCKET



(LEFT SIDE) INSTALL  
END TRUNNION SOCKET BUSHING

FINISH BUSHING I.D.

MACHINE END CROSS BOLT  
HOLE (SMALL) BUSHING

INSTALL END CROSS BOLT  
HOLE (SMALL) BUSHING

MACHINE END CROSS BOLT  
HOLE (LARGE) BUSHING

INSTALL END CROSS BOLT  
HOLE (LARGE) BUSHING

MACHINE MOUNTING FLANGE  
BOLT HOLE (FWD END)

INSTALL MOUNTING FLANGE  
BOLT HOLE (FWD END)

MACHINE FLANGE BOLT HOLE  
BUSHING (AFT END)

INSTALL MOUNTING FLANGE BOLT  
HOLE BUSHING (AFT END)

MACHINE AFT DOOR LEVER  
LUG HOLE (RIGHT SIDE)  
BUSHING

INSTALL AFT DOOR LEVER  
LUG HOLE (RIGHT SIDE)  
BUSHING

MACHINE AFT DOOR LEVER  
LUG HOLE (LEFT SIDE)  
BUSHING

INSTALL AFT DOOR LEVER  
LUG HOLE (LEFT SIDE)  
BUSHING

MACHINE FWD. DOOR LEVER  
LUG HOLE BUSHING

INSTALL FWD. DOOR LEVER  
LUG HOLE BUSHING

MACHINE FWD. DOOR LEVER  
LUG FACE BUSHING  
(LEFT SIDE)

INSTALL FWD DOOR LEVER  
LUG HOLE (LEFT SIDE)  
BUSHING

MACHINE ACTUATOR LUG  
BUSHING

INSTALL ACTUATOR LUG  
BUSHING

REIDENTIFY

C-141 N. L. G.  
AXLE

NICK & BURR

RECENTER AXLE

CHASE THREADS

REPAIR CROSS BOLT HOLE  
QS

FIRST GRIND AXLE CENTER  
JOURNAL

FIRST GRIND LARGE JOURNAL

FIRST GRIND SMALL JOURNAL

POLISH O.D. BETWEEN JOURNALS

FINISH GRIND CENTER JOURNALS

FINISH GRIND LARGE JOURNALS

FINISH GRIND SMALL JOURNALS

MACHINE CROSS BOLT  
HOLE BUSHING

INSTALL CROSS BOLT  
HOLE BUSHING

C-141 N.L.G.  
INNER CYLINDER

NICK & BURR

REPAIR TORQUE ARM  
ATTACH LUG  
O/S

REPAIR AXLE ATTACH  
LUG

REPAIR AXLE ATTACH  
LUG BUSHING

REPAIR CROSS BOLT HOLE  
O/S

REPAIR TOW LUG O/S

FIRST GRIND PISTON O.D.

FIRST GRIND PISTON UPPER  
END O.D.

POLISH METERING PIN I.D.

FIRST GRIND METERING  
PIN I.D.

FINISH GRIND INNER CYLINDER  
LONG AREA

FINISH GRIND INNER CYLINDER  
SHORT AREA

FINISH GRIND METERING AN  
I. D.

MACHINE AXLE ATTACH LUG

MACHINE CROSS BOLT HOLE Q/S

HONE AXLE ATTACH LUG

MACHINE TORQUE ARM  
ATTACH LUG BUSHING

INSTALL TORQUE ARM  
ATTACH LUG BUSHING

MACHINE TOW LUG BUSHING

INSTALL TOW LUG BUSHING

MACHINE AXLE ATTACH  
LUG BUSHING

INSTALL AXLE ATTACH  
LUG BUSHING

FINISH I.D. AXLE ATTACH  
LUG

COUNTER BORE AXLE  
ATTACH LUG HOLE

MACHINE AXLE CROSS BOLT  
HOLE BUSHING

INSTALL AXLE CROSS BOLT  
HOLE BUSHING

HONE AXLE ATTACH LUG



C-141 N.L.G.  
OUTER CYLINDER

FIRST GRIND TRUNNION  
JOURNAL

FINISH GRIND TRUNNION  
JOURNAL

FIRST GRIND COLLAR  
JOURNAL (CHROME)

FIRST GRIND COLLAR  
JOURNAL (FLAME SPRAY)

FIRST GRIND UPPER BORE  
(CHROME)

FIRST GRIND LOWER BORE  
(CHROME)

REMOVE LINK PIN

EXTERNAL DEFECT REPAIR

POLISH O.D. OF CYLINDER

REPAIR DRAC ATTACH LUG  
O/S

REPAIR ACTUATOR LUG O/S

REPAIR TORQUE LUG O/S

MACHINE FILLER TUBE HOLE

REPAIR STEERING LUG O/S

REPAIR LINK PIN HOLE O/S

REPAIR STEERING FLANGE  
RADIUS

REMOVE PITTING ON STEERING  
FLANGE

MACHINE VERTICLE SLOTS FOR  
KEYWAYS

RELOCATE & MACHINE NEW  
KEY SLOTS

REMOVE CORROSION IN RING  
GROOVE

HONE PISTON

FIRST GRIND  
PISTON F.D.

FINISH GRIND  
PISTON O.D.

FINISH GRIND  
AXLE JOURNAL #1

FINISH GRIND  
AXLE JOURNAL #2

FINISH GRIND  
AXLE JOURNAL #3

FINISH GRIND  
AXLE JOURNAL #4

FINISH GRIND  
I.D. SEAL AREA

MANUFACTURE  
JACK PAD BOSS STEEL INSERT

INSTALL JACK PAD  
BOSS STEEL INSERT

MACHINE BUSHING O.D.  
TORQUE ARM ATTACH  
LUG

MACHINE BUSHING O.D.  
TOW LUG

INSTALL TOW LUG  
BUSHING

B-52 M.L.G.  
OUTER CYLINDER ASSY

COUNTERBORE OUTBOARD  
TRUNNION

REPAIR INBOARD TRUNNION  
HEMPLOCK TUBE

REPAIR KEYWAYS CENTERING  
CAM

REMOVE LATCHES KEYS

REPAIR OUTBOARD TRUNNION

REPAIR INBOARD TRUNNION

REPAIR OUTBOARD TRUNNION  
RADIUS

REPAIR INBOARD TRUNNION  
RADIUS

REPAIR ORIFICE TUBE HOLE

REPAIR OUTBOARD TRIPOD  
LUG HOLE

REPAIR INBOARD TRIPOD  
LUG HOLE

REPAIR LOWER TRIPOD  
LUG HOLE

REPAIR STEERING LUG  
HOLE (INBOARD)

REPAIR STEERING LUG  
HOLE (OUTBOARD)

REPAIR STEERING LUG  
COUNTERSINK

REPAIR ACTUATOR LUG  
HOLE (SMALL)

REPAIR ACTUATOR LUG  
HOLE (LARGE)

REPAIR ACTUATOR LUG  
KEY SLOT

REPAIR DOOR ACTUATOR LUG

REPAIR DOOR ACTUATOR LUG  
(SEAT)

REPAIR DOOR ACTUATOR LUG  
HOLE

REAM LUG HOLE

ROLL BURNISH LUG HOLE O/S

REAM LUG HOLE

ROLL BURNISH LUG HOLE O/S

REAM LUG HOLE

ROLL BURNISH LUG HOLE O/S

REAM LUG HOLE

Strip & reaming  
a lug hole  
SP# 502

MACHINE UPPER STEERING JOURNAL

MACHINE LOWER STEERING JOURNAL

NICK & BURR DAMAGED  
AREA

POLISH CYLINDER I.D.  
UPPER BORE

HONE CYLINDER UPPER  
BORE

MACHINE UPPER STEERING  
JOURNAL

MACHINE LOWER STEERING  
JOURNAL

INSTALL FLANGED BUSHINGS

MACHINE INBOARD TRIPOD  
LUG BUSHING

INSTALL INBOARD TRIPOD  
LUG BUSHING

MACHINE OUTBOARD TRIPOD  
LUG BUSHING

INSTALL OUTBOARD TRIPOD  
LUG BUSHING



MACHINE LOWER TRIPOD  
LUG BUSHINGS

INSTALL LOWER TRIPOD  
LUG BUSHINGS

MACHINE INBOARD ACTUATOR  
LUG BUSHINGS

INSTALL INBOARD ACTUATOR  
LUG BUSHINGS

MACHINE OUTBOARD ACTUATOR  
LUG BUSHINGS

INSTALL OUTBOARD ACTUATOR  
LUG BUSHINGS

MACHINE STEERING LUG  
BUSHINGS

INSTALL STEERING LUG  
BUSHING

CLEAN THREADS

INSTALL HELICOILS

MACHINE DOOR ACTUATING  
LUG BUSHINGS

INSTALL DOOR ACTUATING  
LUG BUSHINGS

MACHINE Q/S ORIFICE  
TUBE BUSHING

C-SA N.L.G.  
OUTER CYLINDER

NICK & BURR

LOCAL POLISH

DRAG BRACE LUG HOLE O/S  
REPAIR

RETRACT ARM RIGHT UPPER  
SET O/S REPAIR

RETRACT ARM RIGHT LOWER  
SET O/S REPAIR

RETRACT ARM LEFT UPPER  
SET O/S REPAIR

RETRACT ARM LEFT LOWER  
SET O/S REPAIR

DOOR LUG HOLE RIGHT INSIDE  
SET O/S REPAIR

DOOR LUG HOLE LEFT INSIDE  
SET O/S REPAIR

DOOR LUG HOLE RIGHT  
OUTSIDE SET O/S REPAIR

DOOR LUG HOLE LEFT  
OUTSIDE SET O/S REPAIR

TRUNNION END SOCKET  
LEFT SIDE O/S REPAIR

TRUNNION END SOCKET  
RIGHT SIDE O/S REPAIR

TRUNNION CROSS BOLT  
HOLE (SMALL) REPAIR

TRUNNION CROSS BOLT  
HOLE (LARGE) REPAIR

ACTUATOR BRACKET HOLE  
REPAIR

PULLEY MOUNT HOLE  
REPAIR

STEERING VALVE HOLE  
REPAIR - UPPER LEFT  
LUG

STEERING VALVE HOLE  
REPAIR - UPPER RIGHT  
LUG

STEERING VALVE HOLE  
REPAIR - LOWER LUG

2ND REPAIR - METERING  
TUBE HOLE

FIRST GRIND UPPER STEERING  
JOURNAL (SMALL)

FIRST GRIND UPPER STEERING  
JOURNAL (LARGE)

FIRST GRIND LOWER STEERING  
JOURNAL

FIRST GRIND UPPER BORE

FIRST GRIND LOWER BORE

FIRST REPAIR - GRIND METERING  
TUBE HOLE

2ND REPAIR - GRIND METERING  
TUBE HOLE

FINISH GRIND SMALL  
UPPER STEERING JOURNAL

FINISH GRIND LARGE  
UPPER STEERING JOURNAL

FINISH GRIND LOWER  
STEERING JOURNAL

FINISH GRIND LOWER  
BORE

FINISH GRIND METERING  
TUBE HOLE

MACHINE DRAG BRACE LUG  
BUSHING

INSTALL DRAG BRACE LUG  
BUSHING

MACHINE RETRACT ARM LUG  
BUSHINGS - LOWER RIGHT  
SET

INSTALL RETRACT ARM LUG  
BUSHING - LOWER RIGHT  
SET

MACHINE RETRACT ARM LUG  
BUSHINGS - UPPER LEFT SET

INSTALL RETRACT ARM LUG  
BUSHING - UPPER LEFT SET

MACHINE RETRACT ARM LUG  
BUSHING - LOWER LEFT SET

INSTALL RETRACT ARM LUG  
BUSHING - LOWER LEFT SET

MACHINE DOOR LUG BUSHINGS  
RIGHT INSIDE SET

INSTALL DOOR LUG BUSHINGS  
RIGHT INSIDE SET

MACHINE DOOR LUG BUSHINGS  
RIGHT OUTSIDE SET

INSTALL DOOR LUG BUSHINGS  
RIGHT OUTSIDE SET

MACHINE DOOR LUG BUSHING  
LEFT INSIDE SET

INSTALL DOOR LUG BUSHING  
LEFT INSIDE SET

MACHINE DOOR LUG BUSHING  
LEFT OUTSIDE SET

INSTALL DOOR LUG BUSHING  
LEFT OUTSIDE SET

MACHINE TRUNNION END  
SOCKET BUSHING -  
LEFT SIDE

INSTALL TRUNNION END  
SOCKET BUSHING -  
LEFT SIDE

MACHINE TRUNNION END  
SOCKET BUSHING -  
RIGHT SIDE

INSTALL TRUNNION END  
SOCKET BUSHING -  
RIGHT SIDE

MACHINE TRUNNION CROSS  
BOLT HOLE BUSHING -  
RIGHT SIDE



TRUNNION CROSS BOLT HOLE  
RIGHT SIDE BUSHING INSTALLATION

MACHINE TRUNNION CROSS BOLT HOLE  
BUSHING - LEFT SIDE

TRUNNION CROSS BOLT HOLE  
LEFT SIDE BUSHING INSTALLATION

MACHINE ACTUATOR BRACKET LUG  
BUSHING

INSTALL ACTUATOR BRACKET LUG  
BUSHING

MACHINE PULLEY MOUNT LUG  
BUSHING

INSTALL PULLEY MOUNT LUG  
BUSHING

MACHINE STEERING VALVE LUG  
BUSHING UPPER LEFT

INSTALL STEERING VALVE LUG  
BUSHING UPPER LEFT

MACHINE STEERING VALVE LUG  
BUSHING - UPPER RIGHT

INSTALL STEERING VALVE LUG  
BUSHING - UPPER RIGHT

MACHINE STEERING VALVE LUG  
BUSHING - LOWER

INSTALL STEERING VALVE LUG  
BUSHING - LOWER

MACHINE METERING TUBE HOLE  
BUSHING

INSTALL METERING TUBE HOLE  
BUSHING

PRESSURE TEST OUTER CYLINDER  
METERING TUBE HOLE

C-5A N.L.G.  
PISTON & AXLE ASSY

NICK & BURR

RECENTER AXLES

TORQUE ARM LUG HOLE  
REPAIR

KNEELING LUG HOLE REPAIR

FIRST GRIND O.D

FIRST GRIND AXLE JOURNAL #1

FIRST GRIND AXLE JOURNAL #2

FIRST GRIND AXLE JOURNAL #3

FIRST GRIND AXLE JOURNAL #4

FIRST GRIND AXLE JOURNAL #5

FIRST GRIND AXLE JOURNAL #6

FIRST GRIND AXLE JOURNAL #7

FIRST GRIND AXLE JOURNAL #8

FIRST GRIND ORIFICE TUBE HOLE  
I.D.

GRIND PISTON I.D. LOWER BORE

O/S REPAIR - LOWER BORE

GRIND PISTON I.D. UPPER BORE

FINISH GRIND PISTON O.D.

FINISH GRIND AXLE JOURNAL #1

FINISH GRIND AXLE JOURNAL #2

FINISH GRIND AXLE JOURNAL #3

FINISH GRIND AXLE JOURNAL #4

FINISH GRIND AXLE JOURNAL #5

FINISH GRIND AXLE JOURNAL #6

FINISH GRIND AXLE JOURNAL #7

FINISH GRIND AXLE JOURNAL #8

FINISH GRIND ORIFICE TUBE HOLE I.D.

HONE LOWER BORE

MACHINE TORQUE ARM LUG  
BUSHING

INSTALL TORQUE ARM LUG  
BUSHING

MACHINE KNEELING LUG BUSHING

INSTALL KNEELING LUG BUSHING

C-3A N.L.G.  
UPPER TORQUE ARM

NICK & BURR

BASE LUG HOLE REPAIR

APEX LUG HOLE REPAIR

MACHINE BASE LUG BUSHINGS

INSTALL BASE LUG BUSHINGS

MACHINE APEX LUG BUSHING

INSTALL APEX LUG BUSHING

C-SA N.K.G.  
LOWER TORQUE ARM

NICK & BURR

BASE LUG HOLE REPAIR

APEX BOSS REPAIR

MACHINE BASE LUG BUSHINGS

INSTALL BASE LUG BUSHINGS

MACHINE APEX BOSS SLEEVE

INSTALL APEX BOSS SLEEVE

FINISH APEX BOSS SLEEVE O.D.

C-SA N.L.G.  
RETRACT ARM ASSY L/H

MACHINE ROOT LUG BUSHING  
UPPER

INSTALL ROOT LUG BUSHING  
UPPER

MACHINE ROOT LEG BUSHING  
LOWER

INSTALL ROOT LEG BUSHING  
LOWER

MACHINE GIMBAL ATTACH LUG  
BUSHING

INSTALL GIMBAL ATTACH LUG  
BUSHING

MACHINE BALLSCREW ATTACH  
LUG BUSHING

INSTALL BALLSCREW ATTACH  
LUG BUSHING



C-5A N.L.G.  
STEERING COLLAR

NICK & BURR

TORQUE ARM HOLE REPAIR

INDICATOR ATTACH LUG HOLE  
REPAIR

STEERING ARM LUG HOLE  
REPAIR (LEFT)

STEERING ARM LUG HOLE  
REPAIR (RIGHT)

UPPER BEARING BORE REPAIR

LOWER BEARING BORE REPAIR

MACHINE TORQUE LUG BUSHING

INSTALL TORQUE LUG BUSHING

MACHINE INDICATOR ATTACH LUG  
BUSHING

INSTALL INDICATOR ATTACH LUG  
BUSHING

MACHINE STEERING ARM LUG  
BUSHING

STEERING ARM LUG BUSHING  
INSTALL

MACHINE UPPER BORE BEARING

INSTALL UPPER BORE BEARING

MACHINE LOWER BORE BEARING

INSTALL LOWER BORE BEARING

C-SANL  
GIMBAL RING

NICK & BURR

CENTER HOLE REPAIR

FIRST GRIND END  
JOURNAL  
CHROME

FIRST GRIND END  
JOURNAL  
FLAME SPRAY

FIRST GRIND SHOULDER FACES

PLUGH MACHINE END JOURNALS  
AFTER FLAME SPRAY

FINISH GRIND END JOURNALS

FINISH GRIND SHOULDER FACES

MACHINE CENTER HOLE BUSHING

INSTALL CENTER HOLE BUSHING

~~C-5A N.L.G.~~  
RETRACT ARM ATTACH BOLT

FIRST GRIND A.D.

FIRST MACHINE FOR FLAME  
SPRAY

FINISH GRIND O.D.

CSA N.A.G.  
LOWER BEARING

KEYSLOT REWORK

C-5A N.L.G.  
TRUNNION PIN L/H

RECENTER

FIRST GRIND O.D.

FINISH GRIND O.D.

C-SA N.A. 6A  
PISTON STOP TUBE

NICK & BURR

DRILL LOCATING PIN HOLE

RECENTER

STANDARD REPAIR: FIRST  
GRIND O-RING GROOVE

O/S REPAIR: FIRST GRIND  
O-RING GROOVE

HONE I.D.

FIRST GRIND LOWER AREA O.D.

FINISH GRIND LOWER AREA O.D.

FINISH GRIND O-RING GROOVE  
O.D.

HONE I.D.

C-5A N.L.G.  
TORQUE ARM BOLT

NICK & BURR

BORE SMALL I.D.

RECENTER

FIRST GRIND O.D.

FINISH GRIND O.D.

MACHINE BUSHING

INSTALL BUSHING



C-SA N.L. Q  
SPACER ASSY

REMOVE RIG PIN BUSHING

NICK & BURR

RIG PIN HOLE REPAIR

MACHINE RIG PIN BUSHING

INSTALL RIG PIN BUSHING

C-5A N16  
ORIFICE TUBE

DRILL NEW PIN HOLES

C-SA N.L.G.

UPPER CAM

POLISH CAM RAMP

C-SA N L G  
TRUNNION PIN R/H

RECENTER

FIRST GRIND O.O

FINISH GRIND O.D.

C-5A NLG  
RETRACT ARM ASSY

MACHINE ROOT LUG BUSHING  
UPPER

INSTALL ROOT LUG BUSHING  
UPPER

MACHINE ROOT LUG BUSHING  
UPPER

MACHINE ROOT LUG BUSHING  
LOWER

INSTALL RET LUG BUSHING  
LOWER

MACHINE GIMBAL ATTACH LUG  
BUSHING

INSTALL GIMBAL ATTACH LUG  
BUSHING

MACHINE FACE TO FACE

BALLSCREW ATTACH LUG  
BUSHING

C-5A N.L.G  
AXLE NUT BUSHING

DRILL BUSHING & COVER

C-5A M.L.G.  
OUTER CYLINDER

CHECK CONCENTRICITY OF  
DIA "C" TO "B"

CHECK CONCENTRICITY OF  
COLLAR AREA TO DIA "C"

CHECK CONCENTRICITY OF  
UPPER BORE TO DIA "A"

CHECK CONCENTRICITY OF  
LOWER BORE TO DIA "A"

GRIND CHAMFER

FINISH GRIND CYLINDER C.D.

FIRST GRIND UPPER BORE  
I.D.

FIRST GRIND LOWER BORE  
I.D.

FIRST GRIND AREA "C" AS  
NEEDED

HONE LOWER BORE

LOCAL REWORK I.D.

HONE UPPER BORE

LOCAL REWORK I.D.

SECOND REPAIR AREA "C" I.D.

CHECK & RECORD DIMS

COLLAR AREA O.D. REPAIR

REPAIR COLLAR FACE

MACHINE SHOULDER OF THRUST  
BEARING

BALLSCREW HOLE REPAIR -  
RIGHT SIDE

BALLSCREW HOLE FACE REPAIR  
RIGHT SIDE



BALLSCREW HOLE FAKE REPAIR  
LEFT SIDE

BALLSCREW CROSS PIN HOLE  
REPAIR  
LEFT SIDE

BALLSCREW CROSS PIN HOLE  
REPAIR  
RIGHT SIDE

CROSSWIND LUG HOLE REPAIR  
LEFT SIDE

CROSSWIND LUG HOLE REPAIR  
RIGHT SIDE

ROTATION LUG HOLE REPAIR  
LEFT SIDE

ROTATION LUG HOLE REPAIR  
RIGHT SIDE

MANIFOLD LUG HOLE REPAIR  
LEFT SIDE

MANIFOLD LUG HOLE REPAIR  
RIGHT SIDE

FINISH GRIND CYLINDER .00.

FINISH GRIND CYLINDER  
UPPER BORE

FINISH GRIND CYLINDER  
LOWER BORE

HONE LOWER BORE

HONE UPPER BORE

FINISH GRIND AREA "C"

MACHINE AREA "C" BUSHING

INSTALL AREA "C" BUSHING

CUT OFF AREA "C" BUSHING &  
CHAMFER  $30^{\circ} \times .090$

MACHINE UPPER END THRUST  
BEARING

INSTALL UPPER END THRUST  
BEARING

MACHINE UPPER END COLLAR  
BEARING

INSTALL UPPER END COLLAR  
BEARING

MACHINE CROSSWIND LUG HOLE  
BUSHING (L/S)

INSTALL CROSSWIND LUG HOLE  
BUSHING (L/S)

MACHINE CROSSWIND LUG HOLE  
BUSHINGS (L/S)

MACHINE CROSSWIND LUG HOLE  
BUSHINGS (R/S)

INSTALL CROSSWIND LUG HOLE  
BUSHING (R/S)

MACHINE CROSSWIND LUG HOLE  
BUSHING (R/S)

FINISH GRIND AREA "C" BUSHING  
I. D.

COLLAR O.D. BUSHING

FINAL MACHINE UPPER END  
THRUST BEARING

CHECK DIMENSIONS

CHECK CONCENTRICITY OF  
DIA "C" TO "B"

CHECK CONCENTRICITY OF  
UPPER BORE TO DIA "A"

CHECK CONCENTRICITY OF  
LOWER BORE TO DIA "A"

MACHINE BALLSCREW HOLE  
BUSHING (L/S)

INSTALL BALLSCREW HOLE  
BUSHING (L/S)

MACHINE BALLSCREW HOLE  
BUSHING (L/S)

MACHINE BALLSCREW HOLE  
BUSHING (R/S)

INSTALL BALLSCREW HOLE  
BUSHING (R/S)

MACHINE BALLSCREW HOLE  
BUSHING (R/S)

MACHINE BALLSCREW CROSS  
PIN HOLE BUSHINGS (L/S)

INSTALL BALLSCREW CROSS  
PIN HOLE BUSHINGS (L/S)

MACHINE BALLSCREW CROSS  
PIN HOLE BUSHINGS (R/S)

INSTALL BALLSCREW CROSS  
PIN HOLE BUSHINGS (R/S)

MACHINE ROTATION LUG HOLE  
BUSHINGS (LEFT UPPER)

INSTALL ROTATION LUG HOLE  
BUSHINGS (LEFT UPPER)

MACHINE ROTATION LUG HOLE  
BUSHINGS (LEFT UPPER)

MACHINE ROTATION LUG HOLE  
BUSHINGS (LEFT LOWER)

INSTALL ROTATION LUG HOLE  
BUSHINGS (LEFT LOWER)

MACHINE ROTATION LUG HOLE  
BUSHING (LEFT LOWER)

MACHINE ROTATION LUG HOLE  
BUSHING (LEFT LOWER)

MACHINE ROTATION LUG HOLE  
BUSHINGS (RIGHT UPPER)

INSTALL ROTATION LUG HOLE  
BUSHINGS (RIGHT UPPER)

MACHINE ROTATION LUG HOLE  
BUSHING (RIGHT UPPER)

MACHINE ROTATION LUG HOLE  
BUSHING (RIGHT LOWER)

INSTALL ROTATION LUG HOLE  
BUSHING (RIGHT SIDE)

MACHINE ROTATION LUG HOLE  
BUSHING (RIGHT LOWER)

MACHINE MANIFOLD LUG HOLE  
BUSHING (LEFT SIDE)

MACHINE MANIFOLD LUG HOLE  
BUSHINGS (LEFT SIDE)

MACHINE MANIFOLD LUG HOLE  
BUSHING (R/S)

MACHINE MANIFOLD LUG HOLE  
BUSHINGS (R/S)

C-5A M.L.G.  
FWD AXLE

NICK & BURR

COMPENSATOR LUG HOLE  
REPAIR (O/S)

FIRST GRIND LOCKING LUG  
SIDES

FIRST GRIND BEGIE ATTACH  
JOURNAL (LEFT)

FIRST GRIND BEGIE ATTACH  
JOURNAL (RIGHT)

FIRST GRIND LARGE WHEEL  
JOURNAL (LEFT)

FIRST GRIND LARGE WHEEL  
JOURNAL (RIGHT)

FIRST GRIND SMALL WHEEL  
JOURNAL (LEFT)

FIRST GRIND SMALL WHEEL  
JOURNAL (RIGHT)



FIRST GRIND SPACER  
JOURNAL (LEFT)

FIRST GRIND SPACER  
JOURNAL (RIGHT O/B)

FIRST GRIND SPACER  
JOURNAL (RIGHT I/B)

FINISH GRIND LOCKING  
LUG SIDE

FINISH GRIND BOGIE  
ATTACH JOURNAL (LEFT)

FINISH GRIND BOGIE  
ATTACH JOURNAL (RIGHT)

FINISH GRIND LARGE WHEEL  
JOURNAL (LEFT)

FINISH GRIND LARGE WHEEL  
JOURNAL (RIGHT)

FINISH GRIND SMALL WHEEL  
JOURNAL (LEFT)

FINISH GRIND SMALL WHEEL  
JOURNAL (RIGHT)

FINISH GRIND SPACER JOURNAL  
(LEFT)

FINISH GRIND SPACER JOURNAL  
(RIGHT OUTBOARD)

FINISH GRIND SPACER JOURNAL  
(RIGHT INBOARD)

MAKE COMPENSATOR LUG  
BUSHING

INSTALL COMPENSATOR LUG  
BUSHING

SA M.L.G.  
AFT AXLES

FIRST GRIND JOURNAL #1

FIRST GRIND JOURNAL #2

FIRST GRIND JOURNAL #3

FIRST GRIND JOURNAL #4

FIRST GRIND LOCKING LUGS SIDES  
(LEFT)

FIRST GRIND LOCKING LUGS SIDES  
(RIGHT)

FINISH GRIND JOURNAL #1

FINISH GRIND JOURNAL #2

FINISH GRIND JOURNAL #3

FINISH GRIND JOURNAL #4

FINISH GRIND LOCKING LUG  
(SIDES LEFT)

FINISH GRIND LOCKING LUG  
(RIGHT)

C-5A M.L.G.  
UPPER DRAG LINK

FIRST GRIND SHAFT FOR CROME

FINISH GRIND SHAFT

C-5A M.L.G.  
LOWER DRAG SHAFT

FIRST GRIND SHAFT FOR  
CHROME PLATE

FINISH GRIND SHAFT

C-SA M.L.G.  
SPINED TUBE

CHECK SEAL GROOVE  
T.I.R.

CHECK BEARING O.D.  
T.I.R.

RE-CENTER ENDS

NICK & BURR

FIRST GRIND SEAL GROOVE

FINISH GRIND SEAL GROOVE

CHAMFER SEAL GROOVE

C-5A M.L.G.  
BOGIE CENTER BEAM

REMOVE GUDGEON & FWD  
AXLE ATTACH BUSHING

NKK & BURR

GUDGEON ATTACH LUG  
REPAIR

FWD AXLE SOCKET REPAIR

AFT BRACKET ATTACH LUG HOLE  
REPAIR

FWD. BRACKET ATTACH LUG HOLE  
REPAIR

TORQUE ARM LUG HOLE REPAIR

HOUSING ATTACH HOLE REPAIR

CENTER BEAM ATTACH LUG  
HOLE REPAIR

MACHINE GUDGEON ATTACH  
LUG BUSHING

INSTALL GUDGEON ATTACH  
LUG BUSHING

MACHINE FWD AXLE SOCKET  
BUSHING

INSTALL FWD. AXLE SOCKET  
BUSHING

MACHINE AFT BRACKET  
ATTACH LUG BUSHING

INSTALL AFT BRACKET  
ATTACH LUG BUSHING

MACHINE FWD. ATTACH  
LUG BUSHING

INSTALL FWD BRACKET  
ATTACH LUG BUSHING

MACHINE TORQUE ARM  
LUG BUSHING



INSTALL TORQUE ARM  
LUG BUSHING

MACHINE HOUSING ATTACH  
LUG BUSHING

INSTALL HOUSING ATTACH  
LUG BUSHING

MACHINE CENTER BEAM  
ATTACH LUG BUSHING

INSTALL CENTER BEAM  
ATTACH LUG BUSHING

C-5A M.L.G.  
UPPER SIDE BRAKE ARM

BASE LUG HOLE REPAIR

BASE LUG FACE REPAIR

APEX LUG HOLE REPAIR

APEX LUG FACE REPAIR

MACHINE BASE LUG BUSHING

INSTALL BASE LUG BUSHING

MACHINE APEX LUG BUSHING

INSTALL APEX LUG BUSHING

C-SA M.L.G.  
GUDGEON PIN

NICK & BURR

REWORK DAMAGED SPLINES

RECENTER BOTH ENDS

MACHINE OLD FLAME SPRAY

FIRST GRIND LARGE JOURNAL

FIRST GRIND SMALL JOURNAL

SECOND REPAIR GRIND SMALL  
JOURNAL

FIRST REPAIR SELF ALIGNING  
BEARING HOLE

SECOND REPAIR SELF ALIGNING  
BEARING HOLE

SECOND REPAIR - MACHINE  
EXCESS FLAME SPRAY ON  
SMALL JOURNAL

FINISH GRIND LARGE JOURNAL

FINISH GRIND SMALL JOURNAL

FIRST REPAIR - FINISH GRIND  
SELF ALIGNING BEARING  
HOLE

BLEND/POLISH RAISED AREAS  
OF CHROME/NICKLE

SECOND REPAIR - MACHINE  
BEARING BORE SLEEVE

SECOND REPAIR - INSTALL  
BEARING BORE SLEEVE

FINISH MACHINE BEARING  
BORE SLEEVE

INSTALL SELF ALIGNING  
BEARING

C-SAM LUG  
LOWER SIDE BRAKE ARM

BASE LUG HOLE REPAIR

BASE LUG FACE REPAIR

APEX LUG HOLE REPAIR  
QS

APEX LUG FACE REPAIR

MACHINE BASE LUG BUSHING

INSTALL BASE LUG BUSHING

MACHINE APEX LUG BUSHING

INSTALL APEX LUG BUSHING

CSA M.A.G.  
YOKE

REMOVE CENTER BORE  
LINER

NICK & BURR

REPAIR DAMAGED THREADS  
IN CHAIN COVER HOLES

REPAIR CRACKS IN CHAIN  
COVER HOLES

HONE I.D. OF CENTER BORE

MACHINE BALLSCREW FACE  
LEFT SIDE

MACHINE BALLSCREW FACE  
RIGHT SIDE

BALLSCREW HOLE REPAIR -  
LEFT SIDE

BALLSCREW HOLE REPAIR -  
RIGHT SIDE

UPPER SIDE BRACE HOLE  
REPAIR

LOWER SIDE BRACE HOLE  
REPAIR Q/S

TRUNNION END HOLE  
REPAIR (LEFT SIDE)

TRUNNION END HOLE  
REPAIR (RIGHT SIDE)

TRUNNION CROSS PIN  
HOLE REPAIR (LEFT SIDE)

TRUNNION CROSS PIN HOLE  
REPAIR (RIGHT SIDE)

RETAINER BOLT HOLE REPAIR  
LEFT SIDE

RETAINER BOLT HOLE REPAIR  
RIGHT SIDE

BALLSCREW SOCKET BORE  
REPAIR

HONE I.D. OF CENTER  
BORE

INSTALL INSERTS

INSTALL CENTER MOUNTING  
HOLE SLEEVE

MACHINE BALLSCREW HOLE  
BUSHING (LEFT SIDE)

MACHINE BALLSCREW HOLE  
BUSHING (RIGHT SIDE)

INSTALL BALLSCREW HOLE  
BUSHING (RIGHT SIDE)

MACHINE UPPER SIDE BRACE  
HOLE BUSHING

INSTALL UPPER SIDE BRACE  
HOLE BUSHING

MACHINE LOWER SIDE BRACE  
HOLE BUSHING

INSTALL LOWER SIDE BRACE  
HOLE BUSHING



MACHINE TRUNNION END  
HOLE BUSHING (LEFT SIDE)

INSTALL TRUNNION END HOLE  
BUSHING (LEFT SIDE)

MACHINE TRUNNION END HOLE  
BUSHING (RIGHT SIDE)

INSTALL TRUNNION END HOLE  
BUSHING (RIGHT SIDE)

RECORD DIM.

MACHINE TRUNNION CROSS PIN  
HOLE BUSHING (LEFT SIDE)

INSTALL TRUNNION CROSS PIN  
HOLE BUSHING (LEFT SIDE)

MACHINE TRUNNION CROSS PIN  
HOLE BUSHING (RIGHT SIDE)

INSTALL TRUNNION CROSS PIN  
HOLE BUSHING (LEFT SIDE)

MACHINE RETAINER BOLT HOLE  
BUSHING (LEFT SIDE)

INSTALL RETAINER BOLT HOLE  
BUSHING (LEFT SIDE)

MACHINE RETAINER BOLT HOLE  
BUSHING (RIGHT SIDE)

INSTALL RETAINER BOLT HOLE  
(RIGHT SIDE)

MACHINE BALLSCREW SOCKET  
SLEEVE

INSTALL BALLSCREW SOCKET  
SLEEVE

MANUFACTURE REPAIR MEMBER  
#5

INSTALL REPAIR MEMBER #5

C-SA M.L.G.  
POSITIONING COLLAR

REMOVE PWS

POSITIONER LUG HOLE  
REPAIR

CLEVIS LUG HOLE REPAIR  
LEFT SIDE

CLEVIS LUG HOLE REPAIR  
RIGHT SIDE

MACHINE TOP OF SMALL  
TEETH

CHAMFER BIG TEETH

FIRST GRIND COLLAR FACE

FIRST GRIND COLLAR INSIDE

FINISH GRIND COLLAR FACE

FINISH GRIND COLLAR INSIDE

MACHINE PINS

INSTALL PINS

MACHINE POSITIONER LUG  
BUSHING

INSTALL POSITIONER LUG  
BUSHING

MACHINE CLEVIS LUG HOLE  
BUSHING (L/S)

INSTALL CLEVIS LUG HOLE  
BUSHING (L/S)

MACHINE CLEVIS LUG HOLE  
BUSHING (R/S)

INSTALL CLEVIS LUG HOLE  
BUSHING (R/S)

C-SA M.L.G.  
APEX SHAFT

RECENTER

FIRST GRIND SHAFT

FINISH GRIND SHAFT

C-SA M.L.G.  
RETRACT ARM

CROSS PIN HOLE REPAIR

RIG PIN HOLE REPAIR

SMALL ARM HOLE REPAIR

LARGE ARM HOLE REPAIR

FIRST GRIND ARM SHAFT

FINISH GRIND ARM SHAFT

MACHINE LARGE ARM HOLE  
BUSHINGS

INSTALL LARGE ARM HOLE  
BUSHINGS

MACHINE LARGE ARM HOLE  
BUSHINGS

MACHINE SMALL ARM HOLE  
BUSHINGS

INSTALL SMALL ARM HOLE  
BUSHINGS

MACHINE SMALL ARM HOLE  
BUSHINGS

MACHINE CROSS BOLT HOLE  
BUSHING

INSTALL CROSS BOLT HOLE  
BUSHING

MACHINE CROSS BOLT HOLE  
BUSHING

MACHINE BIG PIN BUSHING

INSTALL BIG PIN BUSHING

MACHINE BIG PIN BUSHING

C-5A M.L.G.  
TRUNNION PIN

FIRST GRIND O.D.

FIRST GRIND I.D.

POLISH I.D.

FINISH GRIND PIN O.D.

FINISH GRIND PIN I.D.



C-5A M.L.G.  
ANTI-ROTATION BOLT

FIRST GRIND BOLT SHANK

FINISH GRIND BOLT SHANK

C-SA M.L.G.  
COMPENSATOR LINK

GUDGEON ATTACH LUG HOLE  
REPAIR #1

HONE I.D. OF SELF ALIGNING  
BEARING BORE

FIRST GRIND I.D. OF SELF  
ALIGNING BEARING BORE

FINISH GRIND I.D. OF SELF  
ALIGNING BEARING BORE

MACHINE GUDGEON ATTACH LUG  
BUSHING

INSTALL GUDGEON ATTACH LUG  
BUSHING

2ND REPAIR BEARING HOLE

2ND REPAIR- INSTALL BEARING  
HOLE SLEEVE

FINISH GRIND I.D.

INSTALL SELF ALIGNING BEARING

C-5A M.L.G.  
TRUNNION CROSS BOLT

RECENTER

FIRST GRIND BOLT SHANK

FINISH GRIND BOLT SHANK

C-SA M.L.G.  
SIDE BRACE APEX BOLT

RECENTER

FIRST GRIND BOLT SHANK

FINISH GRIND BOLT SHANK

C-SAM L.G.  
COLLAR LOCK COLLAR

NKK & BURR

ATTACH LUG HOLE (L/S)  
REPAIR

ATTACH LUG HOLE (R/S)  
REPAIR

MACHINE ATTACH LUG BUSHING  
(L/S)

INSTALL ATTACH LUG BUSHING  
(L/S)

MACHINE ATTACH LUG BUSHING  
(R/S)

INSTALL ATTACH LUG BUSHING  
(R/S)

C-SA M.L.G.  
SAFETY STOP FITTING

ATTACH LUG HOLE REPAIR  
(FWD)

ATTACH LUG HOLE REPAIR  
(AFT)

MACHINE ATTACH LUG HOLE  
BUSHING (FWD)

INSTALL ATTACH LUG HOLE  
BUSHING (FWD)

MACHINE ATTACH LUG HOLE  
BUSHING (AFT)

INSTALL ATTACH LUG HOLE  
BUSHING (AFT)

CSA M/G.  
BRAKE COLLAR

WCK & BURR

ATTACH LUG HOLE REPAIR

FIRST GRIND INSIDE LARGE  
BEARING LAND

FIRST GRIND LOCKING LUG  
SIDES

FINISH GRIND LOCKING LUG  
SIDES

MACHINE LARGE BEARING  
LAND

MACHINE ATTACH LUG  
BUSHING

C-5A M.L.G.  
PITCH COLLAR ASSY

SIDE LUG HOLE REPAIR  
RIGHT (O/S)

SIDE LUG HOLE REPAIR  
LEFT (O/S)

TOP LUG HOLE REPAIR  
(O/S)

BOTTOM LUG HOLE REPAIR  
LEFT (O/S)

BOTTOM LUG HOLE REPAIR  
RIGHT (O/S)

GRIND I.D. OF AXLE ATTACH  
LUG

ROUGH MACHINE I.D

FINISH GRIND I.D

MACHINE SIDE LUG (LEFT)



INSTALL SIDE LUG BUSHING  
LEFT

MACHINE SIDE LUG BUSHING  
RIGHT

INSTALL SIDE LUG BUSHING  
RIGHT

MACHINE TOP LUG BUSHING

INSTALL TOP LUG BUSHING

MACHINE BOTTOM LUG BUSHING  
LEFT

INSTALL BOTTOM LUG BUSHING  
LEFT

MACHINE BOTTOM LUG BUSHING  
RIGHT

INSTALL BOTTOM LUG BUSHING  
RIGHT

C-5A M.L.G  
LOCK RING ASSY

MATCH - UP

PRE-ASSEMBLE

ASSEMBLE

C-5A M.L.G.  
ANCHOR SHAFT

O/S PIN HOLE

O/S THREADED HOLE

FIRST GRIND LARGE JOURNAL

FIRST GRIND SMALL JOURNAL

SECOND GRIND LARGE JOURNAL

SECOND GRIND SMALL JOURNAL

POLISH

MACHINE BUSHING

INSTALL BUSHING

INSTALL INSERT

C-SA M.I.G.  
ROUND NUT

MACHINE 4 NEW WRENCHING  
SLOTS

MACHINE EXISTING SLOTS

C-SA M.L.G.  
THRUST BEARING LOCK COLLAR

MACHINE THRUST  
BEARING

C-SAM-26  
LOCK ROLLER FITTING

FLANGED ROLLER ATTACH  
BOSS REPAIR

TRACK BRACKET ATTACH  
BOSS REPAIR

STRAIGHT ROLLER ATTACH  
BOSS REPAIR

SMALL ATTACH BUSHING  
HOLE REPAIR

MACHINE TRACK ATTACH  
BUSHINGS

INSTALL TRACK BRACKET  
ATTACH BUSHINGS

MACHINE SMALL ATTACH  
BUSHINGS

INSTALL SMALL ATTACH  
BUSHINGS

MACHINE FLANGED ROLLER  
ATTACH BUSHING

INSTALL FLANGED ROLLER  
ATTACH BUSHING

MACHINE STRAIGHT ROLLER  
ATTACH BUSHING

INSTALL STRAIGHT ROLLER  
ATTACH BUSHING

MODIFY

C-5A MILG  
TRACK ROLLER BRACKET

REMOVE HELICOILS

LOCK ROLLER BOSS REPAIR

LOCK ROLLER FITTING ATTACH  
BOSS REPAIR

SMALL BOGIE ATTACH  
BOSS REPAIR

LARGE BOGIE ATTACH  
BOSS REPAIR

SMALL ATTACH BOSS REPAIR

MACHINE LOCK ROLLER ATTACH  
BUSHINGS

INSTALL LOCK ROLLER ATTACH  
BUSHINGS

MACHINE LOCK ROLLER ATTACH  
BUSHING



INSTALL LOCK ROLLER  
FITTING ATTACH BUSHINGS

MACHINE SMALL BOGIE  
ATTACH BUSHINGS

INSTALL SMALL BOGIE  
ATTACH BUSHINGS

MACHINE LARGE BOGIE  
ATTACH BUSHINGS

INSTALL LARGE BOGIE  
ATTACH BUSHINGS

MACHINE SMALL ATTACH  
BUSHINGS

INSTALL SMALL ATTACH  
BUSHINGS

INSTALL HELICOILS

C-5A M.L.G.  
FLUID TRANSFER HOUSING.

FIRST HONE

SECOND HONE

NICK & BURR

MACHINE FITTING LOG HOLE  
BORE

MACHINE OD

PIN HOLE REPAIR

HONE I. D.

POLISH I. D.

MACHINE FLAME SPRAY

MACHINE SMALL BUSHINGS

INSTALL SMALL BUSHINGS

MACHINE LARGE BUSHING

REMOVE LEE PLUGS

INSTALL SMALL BUSHING

INSTALL HELICOILS

INSTALL LARGE BUSHINGS

MACHINE PIN BUSHINGS

C-SA M.L.G.  
BALLSCREW PIN

RECENTER ENDS

FIRST GRIND O.D.

C-SA M.L.G.  
GAUGE

ROLL CRIMP

INSTALL TUBE & LENS  
USE SEALANT

C-SA M.L.G.  
SWIVEL FITTING

END HOLE O/S REPAIR

THREADED END REPAIR

DRILL HOLES

MFG. STUD

MACHINE END HOLE BUSHING

INSTALL END HOLE BUSHING

INSTALL INSERT

CHASE THREADS

C-SA M.L.G.  
SWIVEL FITTING (INT)

END HOLE Q/S REPAIR

THREADED END REPAIR

DRILL HOLES

MFG. STUD

MACHINE END HOLE BUSHING

INSTALL END HOLE BUSHING

INSTALL INSERT

CHASE THREADS

PRESSURE PLATE

U.S. NAVY

REAM FASTENER HOLES



BACKING PLATE

REAM BRAKE LINING HOLES

FS 90

ROTOR SEGMENT ASSY

W254 030

MODIFY SEGMENT & REIDENTIFY

22

04

GRIND SEGMENT AREA

STATION PLATE

BEAM BRAKE LINING HOLES

90

CARRIER ASSY

ANCHOR NUT SCREW HOLE  
REPAIR

DRILL & TAP INLET PORT

DRILL & TAP BLEEDER PORT

MOUNTING BOLT HOLE BUSHING  
REPAIR

REAM UNDER SIZE HOLES

HELICOIL INLET PORT

HELICOIL BLEEDER PORT

HELICOIL RETURN SPRING  
BRACKET SCREW HOLES

DRILL CROSSOVER PORT

INSTALL MOUNTING BOLT  
HOLE BUSHING

CRACKED RADIOS REPAIR

DRILL & TAP INLET PORT

DRILL & TAP BLEEDER  
PORT

BORE SPRING PIN LOSS

OVERSIZE PISTON AREA

HELICOIL INLET PORT

HELICAL BLEEDER PORT

MOUNT BOLT HOLE  
BUSHING REPAIR

REMOVE RIVETS ON  
HOUSING

INSTALL MOUNT BOLT  
HOLE BUSHING

BACKING PLATE

MODIFY ELONGATED  
HOLES

MODIFY PER DWG  
AXE - 32231

STATION

W 30 31 02

RADIUS HEAT RELIEF HOLES

CA 140

2F

REAM FASTENER HOLES

PRESSURE PLATE

02

REFINER ELONGATED HOLES



ROTOR SEGMENT ASSY

GRIND ROTOR

HOUSING

MACHINE CAVITY

DRILL & TAP INLET PORT

DRILL & TAP BLEEDER PORT

ASSY BOLT HOLE REPAIR

PISTON PIN SEAL AREA

CHECK HELICOLS

INSTALL HELICOLS

ROTOR

GRIND ROTOR

PLATE SUBASSY

MACHINE RADIUS

Q8  
Q8  
Q8

ALIGNMENT HOLE REPAIR

INSTALL ALIGNMENT HOLE  
BUSHING

REMOVE INSERTS

REMOVE SS. WEAR RING

REPAIR HUB AREA

REMOVE PIN PLUG

MODIFY HOUSING PER  
T.C.T.O 481-2-552

MACHINE TORQUE LUGS

DRILL & TAP TORQUE  
LUG SHIMS

INSTALL INSERTS

INSTALL PIN PLUGS

INSTALL TORQUE LUG  
SHIMS

INSTALL RING

HOUSING ASSY

WIP

030

MACHINE FACE OF  
HOUSING

OF

ON

Q

43

REIDENTIFY

REMOVE PITTING

REMOVE THREADED  
INSERTS

REPLACE THREADED  
INSERTS

TORQUE TUBE

REMOVE & REPLACE  
INSERTS

BACKING PLATE

TERMINAL HOLE REPAIR

RADIUS O/S TERMINAL  
HOLES

RESURFACE PLATE

RADIUS STD. TERMINAL  
HOLES



HEAT SHIELD HOUSING

MODIFY PER TO

PISTON ROSSIN ASSY

MACHINE UPPER SEAL LAND

MACHINE LOWER SEAL LAND

THREAD CLEAN UP PISTON  
CAVITY

THREAD CLEAN UP INLET  
PORTS

THREAD CLEAN UP BLEEDER  
PORTS

PLUG REPAIR

INSTALL O/S LEE PLUG

PRESERVE PLATE

REMOVE HELICOILS

OUTER CYLINDER

REMOVE BUSHINGS

HONE LOWER BORE

HONE UPPER BORE

NKK & BURR

O/S DRIFICE TUBE  
BUSHING REPAIR

O/S DRAG BRACE  
BOSS CHECK

O/S TRUNNION  
SOCKET CHECK

O/S INBOARD TURY  
BOSS CHECK

O/S OUTBOARD  
TRUNNION BOSS CHECK

O/S DOOR DRIVE BOSS  
CHECK

CROSS IN WHITE  
CHECK

FIRST GRIND LOWER  
BORE

FIRST GRIND OUTBOARD  
TRUNNION BOSS

FIRST GRIND COLLAR  
AREA

FINNISH GRIND COLLAR  
O.D.

FINNISH GRIND OUTBOARD  
TRUNNION BOSS

FINISH GRIND LOWER  
BORE

1/2 ORIFICE TUBE  
BUSHING REPAIR

MACHINE UPPER DRAG  
BUSHING # 96

UPPER DRAG BUSHING  
INSTALLATION

MACHINE Q/S UPPER  
DRAG BUSHING #31

Q/S UPPER DRAG  
BUSHING INSTALL

MACHINE UPPER  
JURY LINK BUSH

INSTALL UPPER JURY  
LINK BUSHING

MACHINE Q/S UPPER  
JURY LINK BUSHING  
OUTBOARD

INSTALL Q/S UPPER  
JURY LINK BUSHING

MACHINE UPPER JURY  
LINK BUSHING INBOARD

INSTALL UPPER JURY  
LINK BUSHING

MACHINE Q/S UPPER  
JURY LINK BUSHING  
INBOARD

INSTALL O/S UPPER  
JURY LINK BUSHING

MACHINE STD. DOOR  
DRIVE BUSHING

INSTALL STD. DOOR  
DRIVE BUSHING

MACHINE O/S DOOR  
DRIVE BOSS BUSHING

INSTALL O/S DOOR  
DRIVE BOSS BUSHING

MACHINE STANDARD  
TRUNNION BUSHING

INSTALL STANDARD  
TRUNNION BUSHING

MACHINE O/S TRUNNION  
SOCKET BUSHING #32

INSTALL O/S TRUNNION  
SOCKET BUSHING #32

P70

P30

P31

P32

P33

P34

F-15 MILG  
PISTON ASSY

NICK & BURR

POLISH OR HONE  
LARGE AXLE I.D.

POLISH OR HONE  
SMALL AXLE I.D.

N/S TORQUE ARM  
BOSS CHECK

N/S UPLOCK BOSS  
CHECK

POLISH BRAKE  
FLANGE HOLE

FIRST GRIND PISTON  
O.D.

FIRST GRIND PISTON  
I.D. METERING  
PIN SEAL AREA



FIRST GRIND INNER  
AXLE JOURNAL

FIRST GRIND OUTER  
AXLE JOURNAL

FINISH GRIND PISTON  
O. D.

FINISH GRIND PISTON  
ID. METERING PIN  
SEAL AREA

FINISH GRIND INNER  
AXLE JOURNAL

FINISH GRIND OUTER  
AXLE JOURNAL

MACHINE TORQUE ARM  
BUSHING

INSTALL TORQUE ARM  
BUSHING

MACHINE O/S TORQUE  
ARM BUSHING

INSTALL O/S TORQUE  
ARM BUSHING

MACHINE CAM FOLLOWER  
BUSHING

MACHINE O/S CAM  
FOLLOWER BUSHING

INSTALL O/S CAM  
FOLLOWER BUSHING

DRILL PISTON HEAD

POLISH HARD  
ANODIZED AREAS

DISASSEMBLE

POLISH TUBE

POLISH HARD  
ANODIZED AREAS

TORQUE ARM

REMOVE TORQUE  
ARM PIN

Q/S LOCK PIN

FIRST GRIND BASE  
LUG FACES

FIRST GRIND APEX  
LUG FACES

FIRST GRIND BASE  
BOSS I.D.

FIRST GRIND APEX  
LUG BOSS I.D.

FINISH GRIND BASE  
LUG FACE

FINISH GRIND APEX  
FACE

FINISH GRIND BASE  
BOSS I.D.

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F-5 MLC 13.80  
APEX PIN - JURY LINK

FIRST GRIND PIN  
O.D.

FINISH GRIND PIN  
O.D.

PLG  
TRUNNION PIN

POLISH CROSS PIN  
HOLE

021

FIRST GRIND LARGE  
O.D.

FIRST GRIND SMALL  
O.D.

FINISH GRIND LARGE  
JOURNAL

FINISH GRIND SMALL  
JOURNAL

E-15 ALL  
LOWER DRAG BAR

REPLACE LOCK SLEEVE

O/S APEX INBOARD  
BOSS CHECK

O/S OUTBOARD APEX  
CHECK

O/S CYL. ATTACH BOSS  
CHECK

MACHINE NEW LOCK  
SLEEVE

INSTALL NEW LOCK  
SLEEVE

INSTALL RIVET

MACHINE SLEEVE

MACHINE APEX #8  
INBOARD BUSHING



MACHINE APEX  
INBOARD BUSHING

MACHINE O/S APEX  
INBOARD BOSS

INSTALL O/S APEX  
INBOARD BOSS

MACHINE APEX  
OUTBOARD BUSHING

INSTALL APEX  
OUTBOARD BUSHING

MACHINE O/S OUTBOARD  
APEX BOSS

INSTALL O/S OUTBOARD  
APEX BOSS

MACHINE CYL. LUG  
BUSHING #6

INSTALL CYL. LUG  
BUSHING #6

MACHINE O/S CYL.  
ATTACH BOSS

**RESEARCH**

**2025**

WORKING PIN

UPD'E

MACHINE CROSS BOLT  
HOLE

SE

02

FIRST GRIND PIN SMALL  
O.D.

FIRST GRIND LARGE  
O.D.

FINISH GRIND PIN

FINISH GRIND LARGE  
O.D.

IS ALG

JURY LINK

POLISH SPRING  
ATTACH HOLE

O/S APEX LUG BOSS  
CHECK

O/S GROUND LUG BOSS  
CHECK

O/S DRAG BRAKE LUG  
BOSS CHECK

MACHINE STD APEX  
FLANGED BUSHING

INSTALL STD APEX  
FLANGED BUSHING

MACHINE O/S APEX  
FLANGED BUSHING

INSTALL O/S APEX  
FLANGED BUSHING

INSTALL STD DRAG  
BRACE BOSS BUSHING

HONE STD DRAG BRACE  
BOSS BUSHING

MACHINE O/S DRAG BRACE  
BUSHINGS

INSTALL O/S DRAG  
BRACE BUSHINGS

HONE O/S DRAG BRACE  
BOSS BUSHINGS

INSTALL O/S GROUND  
BOSS

MACHINE O/S GROUND  
BOSS

E-5 MLC  
UPPER JURY LINK

REMOVE PIN

REMOVE BUSHINGS

POLISH ATTACH  
HOLE

O/S CYL. SOCKET  
CHECK

MACHINE STAKE METAL

O/S APEX BOSS CHECK

REWORK GROUND  
BOSS SLCT

FIRST GRIND LINK  
O.D.

FINISH GRIND LINK  
O.D.

INSTALL BEARING  
MACHINE O/S CYL SOCKET  
BUSHING

INSTALL O/S CYL SOCKET  
BUSHING

MACHINE FINISH SOCKET  
BUSHING

MACHINE STD. APEX  
BUSHING

INSTALL STD. APEX  
BUSHING

HONE STD. APEX FLANGED  
BUSHINGS

MACHINE O/S APEX  
BUSHINGS

INSTALL O/S APEX  
BUSHINGS

HONE O/S APEX  
BUSHINGS

FIRST GRIND SMALL

O.D.

FINISH GRIND SMALL

O.D.



SPINDLE

CHECK DIS BUSHINGS

BOSS

FIRST GRIND LARGE  
O.D.

FIRST GRIND SMALL  
O.D.

FINISH GRIND LARGE  
O.D.

FINISH GRIND SMALL  
O.D.

MACHINE BUSHINGS

INSTALL BUSHINGS

MACHINE O/S BUSHING

INSTALL O/S BUSHING

O/S BUNGEE BOSS  
CHECK

RECENTER

FIRST GRIND PIN O.D.

FINISH GRIND PIN O.D.

MACHINE FLANGED  
BUSHINGS

INSTALL FLANGED  
BUSHINGS

MACHINE O/S BUNGEE  
BOSS BUSHING

INSTALL O/S BUNGEE  
BOSS BUSHING

MACHINE COLLAR I.D.

REMOVE TORQUE ARM  
LUGS

MACHINE SPINDLE LUG  
UPPER

MACHINE SPINDLE LUG  
LOWER

INSTALL COLLAR  
BUSHING

MACHINE COLLAR BUSHING

MACHINE COLLAR BUSHING  
O/S

INSTALL COLLAR BUSHING  
O/S

MACHINE COLLAR BUSHING  
O/S

INSTALL SPINDLE LUG  
BUSHING

INSTALL SPINDLE LUG  
BUSHING #15

INSTALL SPINDLE LUG  
BUSHING #16

MACHINE SPINDLE LUG  
BUSHING O/S #16

INSTALL SPINDLE LUG  
BUSHING O/S #16

MACHINE TORQUE ARM  
LUG BUSHING #19

INSTALL TORQUE ARM  
LUG BUSHING #19

MACHINE TORQUE ARM  
LUG BUSHING #19

INSTALL TORQUE ARM  
LUG BUSHING #19

STURDY BRAKE APPL. IN

FIRST GRIND LARGE O.D.

FIRST GRIND SMALL F.D.

FINISH GRIND O.D.

FINISH GRIND O.D.

SPRING

REMOVE BUSHING

INSTALL BUSHING  
IN LUG HOLES

15  
COLLAR TRUNNION  
O/S BUNGEE ATTACH  
BOSS CHECK

O/S FLANGE BUSHING  
BOSS CHECK

MODIFY COLLAR

FIRST GRIND COLLAR  
I. D.

FINISH GRIND COLLAR  
I. D.

MACHINE BUNGEE ATTACH  
BUSHING

INSTALL BUNGEE ATTACH  
BUSHING & REAM

MACHINE FLANGED  
BUSHING

INSTALL FLANGED BUSHING  
& REAM

CONNECTING LINK AS

REMOVE SPHERICAL  
BEARING & MACHINE  
STAKE METAL

INSTALL NEW SPHERICAL  
BEARING STAKE

MACHINE BUSHING

INSTALL BUSHING &  
MACHINE I.D.

MACHINE BUSHING

INSTALL BUSHING &  
MACHINE I.D.



REMOVE CYL. BUSHING  
MACHINE HOLE

MACHINE O/S BUSHING

INSTALL O/S BUSHING  
MACHINE I.D.

DRILL .410 DIA. THRU

REAM & MACHINE  
HOLE I.D.

MACHINE LINK HOLE

MACHINE O/S LINK  
BUSHING

INSTALL O/S LINK  
BUSHING  
& MACHINE I.D.

HIGH PRESSURE SCHE  
PISTON

FIRST GRIND PISTON  
LANDS O.D.

FIRST GRIND PISTON  
LANDS I.D.

FIRST GRIND PISTON  
GROOVE O.D.

FIRST GRIND PISTON  
GROOVE I.D.

FINISH GRIND PISTON  
LANDS O.D.

FINISH GRIND PISTON  
LANDS I.D.

FINISH GRIND PISTON  
GROOVE O.D.

FINISH GRIND PISTON  
GROOVE I.D.

F-15 MLG  
MISC. ALUM. CAT. A-1

FINAL ACCEPTANCE  
OF W.C.D.

FINAL PRODUCT  
VISUAL INSPECTION

F-15 NLG  
OUTER CYLINDER

BUSHING REMOVAL

REWORK O/S ORIFICE TUBE  
SUPPORT BUSHING  
SOCKET

REPAIR ORIFICE TUBE HOLE  
O/S

REPAIR LOWER DRAG BRAKE  
BUSHING O/S

REPAIR TIE DOWN LUG  
BUSHING O/S

REPAIR DOOR LINK LUG  
O/S

REPAIR SUPPORT ARM  
LOWER LUG O/S

REPAIR SUPPORT ARM  
UPPER LUG O/S

UPPER JURY BRACE  
LUG O/S REPAIR

REPAIR TRUNNION SOCKET

MACHINE MOUNTING HOLE  
O/S

POLISH UPPER BORE

HONE UPPER BORE

POLISH LOWER BORE

HONE LOWER BORE

POLISH UPPER BORE

POLISH LOWER BORE

FINAL POLISH UPPER  
BORE

FINAL POLISH LOWER  
BORE

MACHINE MOUNTING  
BUSHING O/S

MOUNTING BUSHING O/S  
INSTALLATION

MACHINE DRAG BRACE  
BUSHING

INSTALL DRAG BRACE  
BUSHING

MACHINE DRAG BRACE  
O/S BUSHING

INSTALL DRAG BRACE  
O/S BUSHING

MACHINE UPPER JURY  
BRACE BUSHING

INSTALL UPPER JURY  
BRACE BUSHING

MACHINE UPPER JURY  
BRACE O/S BUSHING

INSTALL UPPER JURY  
BRACE O/S BUSHING

MACHINE UPPER  
SUPPORT ARM BUSHING

INSTALL UPPER  
SUPPORT ARM BUSHING

MACHINE SUPPORT ARM  
UPPER LUG

INSTALL SUPPORT ARM  
UPPER LUG  
O/S BUSHING

MACHINE LOWER SUPPORT  
ARM BUSHING

INSTALL LOWER SUPPORT  
ARM BUSHING

MACHINE SUPPORT ARM  
LOWER LUG O/S BUSHING

INSTALL SUPPORT ARM  
LOWER LUG O/S BUSHING

MACHINE DOOR LINK  
BUSHING

INSTALL DOOR LINK  
BUSHING

MACHINE DOOR LINK  
LUG Q'S BUSHING

INSTALL DOOR LINK  
LUG Q'S BUSHING

MACHINE TRUNNION  
SOCKET BUSHING

INSTALL TRUNNION  
SOCKET BUSHING

MACHINE TRUNNION  
SOCKET Q'S BUSHING

INSTALL TRUNNION  
SOCKET Q'S BUSHING

MACHINE TIE DOWN  
LUG BUSHING

INSTALL TIE DOWN  
LUG BUSHING

MACHINE TIE DOWN  
LUG Q'S BUSHING



INSTALL TIE DOWN O/S  
BUSHING

O/S  
YES

MACHINE ORIFICE TUBE  
HOLE BUSHING

INSTALL ORIFICE TUBE  
HOLE BUSHING- LOWER

MACHINE ORIFICE TUBE  
BUSHING

INSTALL ORIFICE TUBE  
HOLE BUSHING

MACHINE ORIFICE TUBE  
HOLE O/S BUSHING

INSTALL ORIFICE TUBE  
HOLE BUSHING O/S

F-15 NLG  
SUPPORT ARM

O/S LOWER BOLT  
HOLE CHECK

MACHINE LUG FACES

O/S UPPER BOLT  
HOLE CHECK

MACHINE O/S BUSHING

INSTALL FLANGED  
BUSHING

INSTALL O/S BUSHING

MACHINE O/S BUSHING

INSTALL O/S BUSHING

MACHINE UPPER LIP

MACHINE 95° CHAMFER

MACHINE LOWER LIP

Q/S UPPER BEARING I.D. 3.50

Q/S LOWER BEARING I.D. 3.50

MACHINE UPPER BEARING  
I.D.

MACHINE LOWER BEARING  
I.D.

MACHINE UPPER LIP

MACHINE 45° CHAMFER  
ON UPPER LIP

MACHINE LOWER LIP

DRILL HOLE

RE-IDENTIFY

FIS ALL  
PISTON

MACHINE RADIUS

POLISH RADIUS

POLISH OUTER AXLE

POLISH INNER AXLE

POLISH INNER AXLE

UNLOCK BUSHING  
REPAIR

TOW SOCKET  
BUSHING REPAIR

FIRST GRIND PISTON  
O.D.

FIRST GRIND INNER  
AXLE JOURNAL

FIRST GRIND OUTER  
AXLE JOURNAL

FIRST GRIND PISTON  
I.D.

FINISH GRIND INNER  
AXLE JOURNAL

USE 022'E 03N

FINISH GRIND OUTER  
AXLE JOURNAL

FINISH GRIND O.D.

FINISH GRIND PISTON  
I.D.

MACHINE TOWING  
BUSHING

INSTALL TOWING  
BUSHING

MACHINE UPLOCK  
BUSHING

INSTALL UPLOCK  
BUSHING

MACHINE TOW SOCKET  
BUSHING

INSTALL TOW SOCKET  
BUSHING

F-15 NLG  
ORIFICE TUBE

POLISH I.D.

HONE I.D.

CHECK RACEWAYS

FIRST GRIND SEAL  
LANDS

FIRST GRIND TUBE  
SEAL GROOVES

FINISH GRIND SEAL  
LANDS

FINISH GRIND TUBE  
SEAL GROOVES

CHECK RACEWAYS

FIRST GRIND  $4^{\circ}$   
ANGLE

FIRST GRIND  
RACEWAYS

FINISH GRIND 4

ANGLE

22 90

42

FINISH GRIND  
RACEWAYS

2

16

FINISH GRIND  
RACEWAYS

12

1

12

CHECK I.D.

F-15 NLG  
STEERING CRANK

DEC 25 3 44

ch  
01

1ST GRIND BOSS

FINISH GRIND BOSS



F-15 NLG  
UPPER JURY LINK

O/S CYLINDER  
ATTACH BOSS CHECK

O/S ACTUATOR  
BUSHING BOSS CHECK

O/S SPRING BOSS CHECK

O/S DOWNLOCK BOSS  
CHECK

O/S APEX BOSS CHECK

INSTALL STD. BUSHING  
CYLINDER ATTACH BOSS

INSTALL O/S BUSHING  
CYLINDER ATTACH BOSS

INSTALL STD. BUSHING  
ACTUATOR BOSS

INSTALL O/S BUSHING  
ACTUATOR BOSS

INSTALL STD. BUSHING

APEX BOSS

INSTALL Q/S BUSHING

APEX BOSS

INSTALL BUSHING IN

Q/S DOWNLOCK

INSTALL BUSHING IN

Q/S SPRING BOSS

F-15 NLG  
UPPER BRACE ASSY

5 12

WE #90

REMOVE BUSHINGS

NICK & BURR

O/S BOSS FOR  
BUSHING #47

O/S BOSS FOR  
BUSHING #47

O/S BOSS FOR  
BUSHING #46

INSTALL BUSHING  
#46

INSTALL BUSHING  
#48

F-15 NLG  
LOWER BRACE ASSY

REMOVE BUSHINGS

NICK & BURR

O/S APEX LUG BOSS  
CHECK

MACHINE APEX LUG  
BUSHING

INSTALL BUSHING

MACHINE O/S APEX LUG  
BUSHING

INSTALL O/S BUSHING

INSTALL BEARING

F-15 NLG  
JURY LINK LOWER

NICK & BURR

DOWNLOCK LUG HOLE  
O/S REPAIR

SPRING LUG HOLE  
O/S REPAIR

APEX LUG HOLE  
REPAIR

DRAG BRACE LUG  
HOLE REPAIR

INSTALL DOWNLOCK  
BUSHING

MACHINE SPRING LUG  
BUSHING

INSTALL SPRING LUG  
BUSHING

MACHINE APEX LUG  
BUSHING

INSTALL APEX LUG  
BUSHING

MACHINE DRAG BRACE  
LUG BUSHING

INSTALL DRAG BRACE  
LUG BUSHING

HONE DRAG BRACE  
LUG BUSHING

F-15 NLG  
UPPER STEERING BOLT

RECENTER

FIRST GRIND BOLT OD.

FINISH GRIND BOLT OD.

C-141 N.L.G. 0.52M 0.5W  
METERING PIN

22 DEC

CHECK CONCENTRICITY



C-14 N.E.G. 023217 820  
PIN-LOCK CRANK

35 80  
05

MODIFY PIN

TREAT WITH RUST  
PREVENTIVE

C-41 N.L.G. W 55291 000  
CRANK RETAINER

MODIFY RETAINER

MODIFY RETAINER

REIDENTIFY RETAINER

C-41 N.L.G. WCSZ 0300

FILLER TUBE

90

MACHINE FILLER TUBE

BRUSH CAD PLATE

C-MI N.L.G.  
ACTUATOR CRANK

CD  
NO

90

MODIFY CRANK

FIRST GRIND FACES

FIRST GRIND JOURNAL

FINISH GRIND FACE

FINISH GRIND JOURNAL

C-41 N. L. G.  
DOWNLOCK CRANK

MACHINE HOLE

MACHINE CROSSBOLT HOLE

FIRST GRIND SMALL JOURNAL

FIRST GRIND LARGE JOURNAL

FINISH GRIND LARGE  
JOURNAL

FINISH GRIND SMALL  
JOURNAL

MACHINE CROSS BOLT HOLE  
BUSHINGS

INSTALL CROSS BOLT HOLE  
BUSHINGS.

C-41 NLG  
DOWNLOCK BELL CRANK

REPAIR INNER HOLE O/S

REPAIR OUTSIDE HOLE O/S

RECENTER CRANK  
SPOTFACE

RECENTER

FIRST GRIND LARGE JOURNAL

FIRST GRIND SMALL JOURNAL

FINISH GRIND LARGE JOURNAL

FINISH GRIND SMALL JOURNAL

MACHINE INNER HOLE  
BUSHING

INSTALL INNER HOLE  
BUSHING

HONE INNER HOLE

BUSHING

24

20

02

MAKEHINE OUTSIDE HOLE

BUSHING

INSTALL OUTSIDE HOLE

BUSHING

HONE OUTSIDE HOLE

BUSHING

C-MI N.2 G  
DRAG BRACE TRUNNION

REMOVE TRUNNION  
BUSHING

EXTERNAL DEFECT REMOVAL

REPAIR TRUNNION (SMALL) END  
SOCKET

REPAIR TRUNNION (LARGE) END  
SOCKET

CROSS BOLT HOLE REPAIR

CROSS BOLT HOLE REPAIR  
LARGE TRUNNION END

ACTUATOR LUG HOLE  
REPAIR

CENTER ATTACH HOLE  
REPAIR O/S

MACHINE TRUNNION SOCKET  
BUSHING

INSTALL TRUNNION SOCKET  
(SMALL END) BUSHING



FINISH I.D. TRUNNION  
SOCKET BUSHING

MACHINE CROSS BOLT HOLE  
BUSHING

INSTALL CROSS BOLT HOLE  
(SMALL END) BUSHING

FINISH I.D. OF CROSS BOLT  
HOLE

MACHINE TRUNNION SOCKET  
BUSHING

INSTALL TRUNNION SOCKET  
(LARGE END) BUSHING

MACHINE CROSS BOLT HOLE  
BUSHING

INSTALL CROSS BOLT HOLE  
(LARGE END) BUSHING

FINISH I.D. OF CROSS BOLT  
HOLE BUSHING

MACHINE ACTUATOR LUG  
HOLE BUSHING

INSTALL ACTUATOR LUG  
HOLE BUSHING

MACHINE CENTER ATTACH  
HOLE BUSHING

INSTALL CENTER ATTACH  
HOLE BUSHING

C-41 N. L. G.  
AFT DRAG BRAKE

REMOVE INSERT

NICK & BURR

REPAIR TRUNNION ATTACH  
LUG O/S

MACHINE UPPER & LOWER  
TRUNNION ATTACH LUG

REPAIR FWD. ATTACH LUG  
O/S

REPAIR DOWNLOCK ATTACH  
LUG O/S

MACHINE DOWNLOCK LINK  
LUG FACES

ROLL BURNISH LUG HOLES

CLEAN ALL LUBE & OIL  
PASSAGES

MACHINE TRUNNION ATTACH  
LUG BUSHING

INSTALL TRUNNION ATTACH  
LUG BUSHING

MACHINE FWD ATTACH  
LUG BUSHING

INSTALL FWD. ATTACH  
LUG BUSHING

MACHINE DOWNLOCK ATTACH  
LUG BUSHING

INSTALL DOWNLOCK ATTACH  
LUG BUSHING

INSTALL STEEL INSERT

CENT N.L. G.  
FWD. DRAG BRAKE

REMOVE SLEEVE

NICK & BURR

REPAIR PLUNGER BORE

REPAIR AFT LUG HOLE  
Q/S

ROLL BURNISH HOLES

REPAIR CYLINDER  
ATTACH LUG HOLE Q/S

REPAIR LOCK ACTUATOR  
LUG HOLE Q/S

ROLL BURNISH LOCK  
ACTUATOR LUG

ROLL BURNISH ALL  
BUSHING LUG HOLES

REPAIR LOCK PIN HOLES  
Q/S

HONE PLUNGER BORE

MACHINE PLUNGER BORE  
SLEEVE

INSTALL PLUNGER BORE  
SLEEVE

MACHINE AFT LUG BUSHING

INSTALL AFT  
LUG BUSHING

MACHINE CYLINDER ATTACH  
LUG BUSHING

INSTALL CYLINDER ATTACH  
LUG BUSHING

MACHINE LOCK ACTUATOR  
LUG BUSHING

INSTALL LOCK ACTUATOR  
LUG BUSHING

MACHINE LOCK PIN HOLE  
BUSHINGS

INSTALL LOCK PIN HOLES

STD. BUSHINGS

Q129 Q130

MACHINE LOCK PIN HOLE  
BUSHINGS Q/S

INSTALL LOCK PIN HOLE  
Q/S BUSHINGS

STEERING PLATE

REMOVE RAISED TURN  
BOSS

REPAIR CYLINDER LUG  
HOLES Q/S

MACHINE KEYWAY SLOTS

MEASURE I.D.

GRIND I.D.

MACHINE CYLINDER LUG  
HOLE BUSHINGS

INSTALL CYLINDER LUG  
HOLE BUSHINGS



C-141 ALG 1/21 20  
STEERING COLLAR

REMOVE EXTERNAL  
DEFECTS

REPAIR TORQUE ARM  
HOLE

FIRST GRIND COLLAR  
I.D.

FIRST GRIND COLLAR  
FACES

FINISH GRIND COLLAR  
I.D.

FINISH GRIND COLLAR  
FACE

FINISH GRIND COLLAR  
FACE

MACHINE TORQUE ARM  
LUG BUSHING

INSTALL TORQUE ARM  
LUG BUSHING

C-41 N.L.G.  
LOWER BEARING

W 277 (121)

25 490

REMOVE FABROID IF  
I.D. IS DAMAGED

MACHINE FABROID I.D.

MACHINE BEARING I.D.

FINISH MACHINE I.D.

C-41 N. L. G. U.S. 201  
TRUNNION PIN (THREADED)

FIRST GRIND LARGE DIA.

FIRST GRIND SMALL DIA.

GRIND CROSS BOLT HOLE.

FINISH GRIND LARGE O.D.

FINISH GRIND SMALL O.D.

C-141 N.L.G.  
UPPER TORQUE ARM  
& ASSY

NICK & BURR

REAM BASE LUG HOLE

MACHINE FACE (BASE  
& APEX)

REAM APEX LUG HOLE

CHASE THREADS IN  
ZURK FITTING

REIDENTIFY

ROLL BURNISH APEX  
& BASE LUG HOLES

CLEAN ALL LUBE &  
OIL PASSAGES

MACHINE APEX LUG  
HOLE BUSHING

INSTALL APER LUG  
HOLE BUSHING

MACHINE BASE LUG HOLE  
BUSHING

INSTALL BASE LUG HOLE  
BUSHING

C-K11 N. L. G.  
LOWER TORQUE ARM

CHK & BURR

REPAIR BASE LUG HOLE

REPAIR BASE LUG HOLE  
O/S

COUNTERSINK

REPAIR APEX LUG HOLE

REPAIR APEX LUG HOLE  
O/S

COUNTERSINK

CHASE THREADS IN ZURK  
FITTING

REPLACE GREASE FITTING

CLEAN ALL LUBE & OIL  
PASSAGES

MACHINE BASE LUG HOLE  
BUSHING

INSTALL BASE LUG HOLE  
BUSHING

MACHINE APEX LUG BUSHING

INSTALL APEX LUG HOLE  
BUSHING

TRUNNION PIN

FIRST GRIND LARGE O.D.

FIRST GRIND SMALL O.D.

GRIND PIN HOLE

FINISH GRIND LARGE O.D.

FINISH GRIND SMALL O.D.



C-MI N. L. G.  
OLEO TRUNNION

REMOVE BUSHINGS

POLISH I.D.

POLISH I.D. OF TRUNNION  
END

NICK & BURR

REWORK TRUNNION CENTER  
HOLE

REPAIR END TRUNNION  
SOCKET (LEFT SIDE)  
O/S

REPAIR END TRUNNION  
SOCKET (LEFT SIDE)  
O/S

REPAIR END CROSS BOLT  
HOLE (SMALL) O/S

ROLL BURNISH END CROSS  
BOLT HOLE (SMALL)

REPAIR END CROSS BOLT  
HOLE (LARGE) O/S

ROLL BURNISH END CROSS  
BOLT HOLE (LARGE)

(FWD. END REPAIR O/S)  
MOUNTING FLANGE BOLT  
HOLES

(FWD. END) ROLL BURNISH  
MOUNTING FLANGE BOLT  
HOLES

(AFT END REPAIR O/S)  
MOUNTING FLANGE BOLT  
HOLES

(AFT END) ROLL BURNISH  
MOUNTING FLANGE BOLT  
HOLES

(RIGHT SIDE REPAIR O/S)  
AFT DOOR LEVER LUG  
HOLE

(RIGHT SIDE) ROLL BURNISH  
AFT DOOR LEVER LUG

KC-135 M.L.G.  
OLEO TRUNNION

DEFECT REMOVAL

RECENTER OLEO TRUNNION

MACHINE COLLAR

SECOND FIX- COLLAR  
CROSS BOLT HOLE

TRUNNION LUG HOLE  
REPAIR

REPAIR TERMINAL ATTACH  
LUG

REPAIR DRAG ATTACH LUG

REPAIR ACTUATOR ATTACH LUG

LUG K- FIRST REPAIR

LUG K- SECOND REPAIR

LUG L - FIRST REPAIR

FIRST GRIND TRUNNION LUG

FIRST GRIND DRAG ATTACH LUG

FIRST GRIND COLLAR JOURNAL

FIRST GRIND TRUNNION JOURNAL

FINISH GRIND COLLAR JOURNAL

FINISH GRIND TRUNNION JOURNAL

FINISH GRIND TRUNNION LUG FACES

FINISH GRIND DRAG ATTACH LUG(K)

MACHINE TRUNNION LUG HOLE  
BUSHING

REAM TRUNNION LUG HOLE  
BUSHING

MACHINE COLLAR CROSS BOLT HOLE  
BUSHING

INSTALL COLLAR CROSS  
BOLT HOLE BUSHING

MACHINE TERMINAL ATTACH  
LUG BUSHING

INSTALL TERMINAL ATTACH  
LUG (J) BUSHING

MACHINE ATTACH LUG (I)  
BUSHING

INSTALL ACTUATOR ATTACH  
LUG (F) BUSHING

MACHINE DRAG ATTACH  
LUG (K) BUSHING

INSTALL DRAG ATTACH LUG  
(K) BUSHING

INSTALL COLLAR

MACHINE COLLAR

RC-135 M.L.G.  
SIDE STRUT UPPER

REMOVE CRACK INDICATIONS

NICK & BURR

REPAIR UNIVERSAL ATTACH  
LUG O/S

FIRST GRIND ROLLER BOSS

FINISH GRIND ROLLER BOSS

MACHINE UNIVERSAL ATTACH  
LUG BUSHING

INSTALL UNIVERSAL ATTACH  
LUG BUSHING

MACHINE LOWER SIDE STRUT  
ATTACH LUG BUSHING

INSTALL LOWER SIDE STRUT  
ATTACH LUG BUSHING

KC-135 N.L.G.

DRAG STRUT

NICK & BURR

OP

DE

REPAIR UPPER ATTACH LUG

O/S

REPAIR LOWER ATTACH LUG

O/S

MACHINE UPPER ATTACH LUG

BUSHING

INSTALL UPPER ATTACH LUG

BUSHING

MACHINE LOWER ATTACH LUG

BUSHING

INSTALL LOWER ATTACH LUG

BUSHING

KC-135 M.L.G.

COLLAR

REMOVE PITS & CORROSION

MACHINE COLLAR

MACHINE COLLAR LUG F.D.

MACHINE COLLAR BUSHING

INSTALL COLLAR BUSHING



KC-135 M.L.G. 11-2001 JED  
BOLT TRUNNION COLLAR

OP 150

OLEO/COLLAR INSTALLATION

KC-135 M.2. G.  
TRUCK PIVOT BOLT

REWORK ZURK FITTING

CHASE BOLT THREADS

BORE I. D.

RECENTER

FIRST GRIND JOURNAL  
THREADED END

FIRST GRIND JOURNAL  
HEAD END

FINISH GRIND JOURNAL  
THREAD END

FINISH GRIND JOURNAL  
HEAD END

KC-135 M.L.G.  
TRUNNION BOLT

REMOVE BROKEN ZURK

RECENTER

FIRST GRIND JOURNAL  
THREADED END

FIRST GRIND JOURNAL  
HEAD END

FINISH GRIND JOURNAL  
THREADED END

FINISH GRIND JOURNAL  
HEAD END

KC-135 A.L.G. 1404  
UNIVERSAL LOWER  
SIDE STRUT

CP

24

041

REAR LOWER SIDE STRUT  
ATTACH LUGS

MACHINE LOWER SIDE STRUT  
ATTACH LUG BUSHINGS

MACHINE OUTER CYLINDER  
ATTACH LUG BUSHINGS

INSTALL & REAR OUTER  
ATTACH LUG BUSHINGS

KC-135 M.L.G. PARTS  
BRAKE EQUALIZER ROD

REAM TRUCK ATTACH LUG

REAM OLEO ATTACH LUG

MACHINE ATTACH LUG  
BUSHING

INSTALL TRUCK ATTACH LUG  
BUSHING

MACHINE OLEO ATTACH LUG  
BUSHING

INSTALL OLEO ATTACH LUG  
BUSHING

OUTER ROLLER

REMOVE BUSHINGS

GRIND TRUNNION LUGS

GRIND DRAG STRUT LUGS

GRIND SIDE BRAKE LUG

GRIND TORQUE ARM LUG

REPAIR TRUNNION LUGS

MACHINE DRAG STRUT LUGS

MACHINE SIDE BRAKE LUGS

COUNTERBORE TORQUE ARM  
LUGS

MACHINE TORQUE ARM LUGS

UNLOCK SOCKET - FIRST REPAIR

UNLOCK SOCKET - SECOND REPAIR

MACHINE TOOL ATTACH  
LUG HOLES

MACHINE DRIFTE TUBE  
HOLE

GRIND UPPER BORE  
(CHROME PLATE)

GRIND LOWER BORE  
(CHROME PLATE)

FINISH GRIND TRUNNION  
LUG FACE

FINISH GRIND DRAG STRUT  
LUG FACE

FINISH GRIND SIDE BRAKE  
LUG FACE

FINISH GRIND TORQUE ARM  
LUG FACE

FINISH GRIND UPPER BORE

FINISH GRIND LOWER BORE

MACHINE TRUNNION LUGS

MACHINE & INSTALL TRUNNION  
LUG BUSHING

MACHINE DOOR ATTACH LUG  
BUSHING

INSTALL DOOR ATTACH LUG  
BUSHING

MACHINE DRAG STRUT LUG  
BUSHING

INSTALL DRAG STRUT LUG  
BUSHINGS

MACHINE SIDE BRAKE LUG  
BUSHINGS

INSTALL SIDE BRACE LUG  
BUSHINGS

MACHINE TORQUE ARM LUG  
BUSHING



INSTALL TORQUE ARM LUG  
BUSHINGS

MACHINE UNLOCK SOCKET  
2ND REPAIR

UNLOCK SOCKET  
2ND REPAIR

MACHINE ORIFICE TUBE  
HOLE BUSHING

87

320

0.2

2.2

3.2

KC-135 M.L.G.  
INNER CYLINDER

MACHINE PIVOT LUGS

MACHINE TORQUE ARM  
LUGS

MACHINE BRAKE EQUALIZER  
ROD ATTACH LUG

MACHINE SNUBBER ATTACH  
LUG

GRIND TORQUE ARM LUG  
(FACE)

GRIND CYLINDER O.D.

GRIND CYLINDER I.D.

FINISH GRIND TORQUE ARM  
LUG FACE

FINISH GRIND CYLINDER  
O.D.

FINISH GRIND CYLINDER ED

MACHINE TORQUE ARM BUSHINGS

INSTALL TORQUE ARM LUG  
BUSHINGS

MACHINE PIVOT LUG BUSHINGS

INSTALL PIVOT LUG BUSHINGS

MACHINE BRAKE EQUALIZER  
ROD ATTACH LUG BUSHING

INSTALL BRAKE EQUALIZER  
ROD ATTACH LUG BUSHING

MACHINE SNUBBER ATTACH  
LUG BUSHING

INSTALL SNUBBER ATTACH  
LUG BUSHING

KC-135 M.I.G. 1964  
LOWER BEARING

MODIFY

REIDENTIFY

RC-135 M.R.G.  
UNIVERSAL UPPER

SIDE STRUT ATTACH LUGS  
1ST REPAIR

SIDE STRUT ATTACH LUGS  
2ND REPAIR

SIDE STRUT ATTACH LUGS  
LUBE HOLE

SIDE STRUT ATTACH LUG  
FAKE REPAIR

REAM ACTUATOR ATTACH  
LUG

MACHINE SIDE STRUT ATTACH  
LUG BUSHING

SIDE STRUT ATTACH LUG  
1ST REPAIR  
INSTALL & REAM BUSHING

MACHINE SIDE ATTACH LUG  
BUSHING

5. DE-STROY ATTACH LUGS

2ND REPAIR

INSTALL & REAM BUSHING OF

DRILL LUBE HOLE PASSAGE

MACHINE ACTUATOR ATTACH  
LUG BUSHING

INSTALL & REAM ACTUATOR  
ATTACH LUG BUSHING

FINISH GRIND TRUNNION  
JOURNAL

FINISH GRIND COLLAR  
JOURNAL

FINISH GRIND TRUNNION  
JOURNAL (CHROME)

FINISH GRIND COLLAR  
JOURNAL (CHROME)

FINISH GRIND UPPER BORE

FINISH GRIND LOWER BORE

RELOCATE & MACHINE NEW  
KEYWAYS

MACHINE DRAG ATTACH LUG  
BUSHING

INSTALL DRAG ATTACH LUG  
BUSHING

MACHINE ACTUATOR LUG  
BUSHING

INSTALL ACTUATOR LUG BUSHING

MACHINE TORQUE LUG  
BUSHINGS

INSTALL TORQUE LUG  
BUSHINGS

FINISH TORQUE LUG F.D.

MACHINE OR MFG. TUBE

INSTALL TUBE Q/S

MACHINE STEERING LUG  
BUSHING

INSTALL STEERING LUG  
BUSHING

FINISH F. D.

MACHINE LINK PIN

INSTALL LINK PIN



MANPRB

21 3/89

PAGE 1

Entered  
BZ

RCC EARNED HOURS FOR MNPRB... OCT 88 THRU JAN 89

PROD NO.	NOUN	RCC DPEH	RCC DPEH %	CUMM % EARNED HR
1 16837A 1620001099287	STRUTF4C	1345.18	0.0722	0.0722
2 16836A 1620001099286	STRUTF4C	1295.06	0.0695	0.1417
3 17565A 1620010204973	STRUT	1025.88	0.0551	0.1968
4 M9662K 3120P855926-03		840.00	0.0451	0.2419
5 17143A 1620001398474	B52M-AFT	770.88	0.0414	0.2833
6 17142A 1620001398473	B52M-FWD	598.81	0.0321	0.3154
7 16915A 1620009485066	TRUCK AY	562.21	0.0302	0.3456
8 17575A 1620010054191	CSMLGRHA	531.44	0.0285	0.3741
9 25737A 1620011951141	MLGSTRUT	471.19	0.0253	0.3994
10 16019A 1620010248844	STRUT F4	441.23	0.0237	0.4231
11 17402A 1620010627002	F15-NLG	428.05	0.0230	0.4461
12 19588A 1630010585912	WHL F15M	417.69	0.0224	0.4685
13 15068A 1630007776698	B52 BRK	402.22	0.0216	0.4901
14 15988A 1620009825059	POSITNER	361.25	0.0194	0.5095
15 17576A 1620010054192	CSMLGLHA	355.02	0.0191	0.5286
16 17577A 1620010054193	CSM6LLHF	343.06	0.0184	0.5470
17 74524A 1620002458005	BOGIE B	340.41	0.0183	0.5653
18 17578A 1620010054194	CSMLGRHF	316.87	0.0170	0.5823
19 17478A 1620002990278	T38-NLG	282.96	0.0152	0.5975
20 74521A 1620001877445	NLG	271.50	0.0146	0.6121
21 19937A 1620010816339	STRUT AY	270.46	0.0145	0.6266
22 19844A 1620008961203	STRUT AY	243.37	0.0131	0.6397
23 17239A 1620006793440	TRUNNION	233.76	0.0125	0.6522
24 17354A 1620005459439	STRUT NL	210.06	0.0113	0.6635
25 16283A 1620007856073	SHAFT	209.19	0.0112	0.6747
26 74527A 1620004427877	BRACE DR	200.58	0.0108	0.6855
27 17327A 1620009118301	TRUNNION	193.38	0.0104	0.6959
28 26111A 1620012007131	16PISTON	192.77	0.0103	0.7062
29 17595A 1620008372427	A7-NLG	187.32	0.0101	0.7163
30 17407A 1620009921498	BOLT ASY	171.57	0.0092	0.7255
31 72877A 1620004325651	NLG	168.57	0.0090	0.7345
32 15583A 1630008329088	F8111BRK	156.86	0.0084	0.7429
33 17527A 1620010063237	A7-NLG	153.94	0.0083	0.7512
34 69354A 1620010597842	KC-135 N	141.50	0.0076	0.7588
35 72573A 1620000271193	ACTUATOR	138.00	0.0074	0.7662
36 15866A 1620011037747	STRUT	129.77	0.0070	0.7732
37 17451A 1620006518221	TRUNNION	124.76	0.0067	0.7799
38 74692A 1620001791425	BOGIE BM	120.48	0.0065	0.7864
39 17313A 1620006518222	TRUNNION	112.74	0.0061	0.7925
40 T6912A 1620006133512		112.30	0.0060	0.7985
41 42626A 1620007158562	B52-RH.T	107.37	0.0058	0.8043
42 42625A 1620007158561	STRUT	104.18	0.0056	0.8099
43 14781A 1560008561386BF	HKPNT F4	97.38	0.0052	0.8151
44 17357A 1620007419178	BRACE	95.08	0.0051	0.8202
45 M4250K		92.00	0.0049	0.8251
46 72879A 1620004463776	NL6 OUTR	84.39	0.0045	0.8296
47 69752A 1560010410545WF	HJR STAB	80.96	0.0043	0.8339
48 26338A 1620011671000	M-LH-HU	77.15	0.0041	0.8380
49 17474A 1620002640744	T38M-L/H	76.94	0.0041	0.8421
50 17574A 1620003977413	CRK ASSY	75.06	0.0040	0.8461
51 17567A 1620010381912	KC-135 N	72.88	0.0039	0.8500

14491

## RCC EARNED HOURS FOR MNPRB...OCT 88 THRU JAN 89

PROD NO.	NOUN	RCC DPH	RCC DPH X	CUMM X EARNED HR
52 17631A 1620010159859	DR-BRACE	71.50	0.0038	0.8538
53 16315A 1620010710535	F16MAXLE	68.25	0.0037	0.8575
54 26337A 1620011670999	M-RH-HW	66.54	0.0036	0.8611
55 17324A 1620003002261	SHOCK ST	65.60	0.0035	0.8646
56 19938A 1620010856009	A10-MLG	63.16	0.0034	0.8680
57 74652A 1620001486466	BALLSCRW	60.84	0.0033	0.8713
58 17494A 1620003084145	FISH-OUT	60.75	0.0033	0.8746
59 17348A 1620007117771	S STRUT	60.48	0.0032	0.8778
60 15677A 1620011741655	STRUT AY	59.62	0.0032	0.8810
61 17353A 1620005459395	STRUT NL	52.35	0.0028	0.8838
62 72858A 1620003238292	CYLINDER	51.92	0.0028	0.8866
63 19839A 1620007391746	DAMPER	51.69	0.0028	0.8894
64 M8168K		50.00	0.0027	0.8921
65 T6254A 1620008624060		49.30	0.0026	0.8947
66 72868A 1620002223887	CYLINDER	48.96	0.0026	0.8973
67 72864A 1620002307141	PITCH PO	48.34	0.0026	0.8999
68 98929A 1650002193602LE	BUNGEE	48.00	0.0026	0.9025
69 25918A 1620010141984	RHSTRUT	46.28	0.0025	0.9050
70 74552A 1620009270298	PIVOT P	45.76	0.0025	0.9075
71 17418A 1620010135910	SHOCK ST	45.53	0.0024	0.9099
72 74561A 1620001357877	A7-NLG	45.40	0.0024	0.9123
73 72863A 1620001790438	XWIND CL	44.52	0.0024	0.9147
74 16297A 1620010374639	CH3-NLG	42.69	0.0023	0.9170
75 19841A 1620001239478	DAMPER	42.39	0.0023	0.9193
76 T1302A 9999POV10A		40.00	0.0021	0.9214
77 69803A 1620011680338	CH3-NLG	38.49	0.0021	0.9235
78 26258A 1560011411064WF	HORZSTAB	38.40	0.0021	0.9256
79 15295A 1630000827955	F111 BRK	38.32	0.0021	0.9277
80 19838A 1620001177326	DAMPER	38.03	0.0020	0.9297
81 17664A 1620010700632	STRUT	37.75	0.0020	0.9317
82 74516A 1620001791083	BRACE DR	36.40	0.0020	0.9337
83 17663A 1620010660946	STRUT	35.28	0.0019	0.9356
84 15054A 1630000585242	KC135BRK	35.26	0.0019	0.9375
85 28041A 1630002262376	BR PLATE	34.22	0.0018	0.9393
86 69828A 1620005676803	ST VALVE	32.81	0.0018	0.9411
87 17479A 1620010185924	ACTUATOR	32.19	0.0017	0.9428
88 74805A 1005000566753	GUN M61A	31.82	0.0017	0.9445
89 17347A 1620007099371	S STRUT	31.68	0.0017	0.9462
90 16296A 1620004821247	CH3-NLG	31.58	0.0017	0.9479
91 T4798A 1620004853752		30.03	0.0016	0.9495
92 M5244K 1560ND0288856BF		30.00	0.0016	0.9511
93 72571A 1620009101898	ACTUATOR	29.52	0.0016	0.9527
94 17476A 1620002795839	T38M-R/H	27.56	0.0015	0.9542
95 93236A 1620001058930	ACTUATOR	26.64	0.0014	0.9556
96 69658A 1620010389101	STRUT RH	25.50	0.0014	0.9570
97 68878A 1620011009806	STRUT MC	25.14	0.0013	0.9583
98 M9407K		25.00	0.0013	0.9596
99 69613A 1620010692334	MANIFOLD	24.76	0.0013	0.9609
100 15642A 1630010054189	C130 BP	24.15	0.0013	0.9622
101 1775TA 4730007586711LE	BOLT	23.80	0.0013	0.9635
102 T6850A 1620001157419		23.25	0.0012	0.9647

## RCC EARNED HOURS FOR MNPRB...OCT 88 THRU JAN 89

PROD NO.	NOUN	RCC DPEH	RCC DPEH %	CUMM % EARNED HR
103 17687A 1620010805925	INNER CL	23.19	0.0012	0.9659
104 T5305A 1620010888102		22.40	0.0012	0.9671
105 T6295I 1620002421514		22.00	0.0012	0.9683
106 69626A 1620005051184	STRUT AY	20.15	0.0011	0.9694
107 17396A 1620002671046	DAMPER	18.50	0.0010	0.9704
108 25917A 1620010141983	LH8TRUT	18.08	0.0010	0.9714
109 17662A 1620010668945	STRUT-MG	18.04	0.0010	0.9724
110 15161A 1630008810815	C141 BRK	18.00	0.0010	0.9734
111 T4661Q		18.00	0.0010	0.9744
112 16288A 1620009248927	YOKE	16.92	0.0009	0.9753
113 15053A 1630000528403	BRAKEASS	16.80	0.0009	0.9762
114 M7568K 1620000071783		16.50	0.0009	0.9771
115 74975A 1005003005135	BOOSTER	16.32	0.0009	0.9780
116 69833A 1620011031950	STRUT	16.02	0.0009	0.9789
117 26578A 1620ND0537976	DRG BRAC	14.56	0.0008	0.9797
118 15521A 1630008562073	FB111 PP	14.35	0.0008	0.9805
119 69887A 1620007057261	B52-RH-T	14.16	0.0008	0.9813
120 M6275K 3040003556251BF		14.00	0.0008	0.9821
121 72845A 1620001157413	CYLINDER	13.50	0.0007	0.9828
122 M7617K 3120P879409F		13.00	0.0007	0.9835
123 00141B 000V0010A	AIRCRAFT	12.60	0.0007	0.9842
124 72832A 162000018416	STR ACT	11.64	0.0006	0.9848
125 15519A 1630001132133	FB111STR	11.55	0.0006	0.9854
126 17314A 1620003069942	S STRUT	11.52	0.0006	0.9860
127 17315A 1620003069943	S STRUT	11.52	0.0006	0.9866
128 74518A 1620001791087	BRACE DR	10.92	0.0006	0.9872
129 69573A 1620006238913	TORD ST	10.45	0.0006	0.9878
130 15752A 1630010627046	A10 BRK	10.00	0.0005	0.9883
131 T9960A 1620009192742		9.52	0.0005	0.9888
132 73041A 1005003005136	BOOSTER	9.36	0.0005	0.9893
133 74821A 1005003472304	BOOSTER	9.00	0.0005	0.9898
134 69761A 1620004427875	XWIND CL	8.01	0.0004	0.9902
135 M5224K 1560ND029868CBF		7.80	0.0004	0.9906
136 26642A 1620012026349	STRUT AS	7.75	0.0004	0.9910
137 94332A 1620000222523	ACTUATOR	7.56	0.0004	0.9914
138 T7600I 1620010054191		7.00	0.0004	0.9918
139 69775A 5315005006801LE	ROOT PIN	6.90	0.0004	0.9922
140 74525A 5315002952512LE	ROOT PIN	6.90	0.0004	0.9926
141 T9564A 1620008840372		6.76	0.0004	0.9930
142 97709A 1620006986015	CYC	6.45	0.0003	0.9933
143 74551A 1620008670810	SHAFT AS	6.22	0.0003	0.9936
144 63711A 1620000654773	B52-DRAG	6.08	0.0003	0.9939
145 16743A 1620002041208	BELLCRNK	6.06	0.0003	0.9942
146 15229A 1630003154832	T33 BRK	6.00	0.0003	0.9945
147 68735A 1630010830445	F15ABBRK	6.00	0.0003	0.9948
148 T1434A 9999P000V0010A		6.00	0.0003	0.9951
149 97659A 1620006986014	CYLINDER	5.70	0.0003	0.9954
150 16334A 1620010710537	F16MAXLE	5.25	0.0003	0.9957
151 69385A 1620004107094	ROD CYL	4.91	0.0003	0.9960
152 63819A 1005010595785	M61A1	4.81	0.0003	0.9963
153 94829A 1620004023387	ACTUATOR	4.60	0.0002	0.9965

## RCC EARNED HOURS FOR NNPRB...OCT 88 THRU JAN 89

PROD NO.	NOUN	RCC DPEH	RCC DPEH %	CUMM X EARNED HR
54 M6740K 3120011093797		4.50	0.0002	0.9967
55 T4404N 1430ND0260706AH		4.50	0.0002	0.9969
156 19266A 1630010098475	E3A BRK	4.00	0.0002	0.9971
157 62902A 1620000313537	CYLINDER	3.88	0.0002	0.9973
158 26579A 1620ND0520836	DRG BRAC	3.64	0.0002	0.9975
159 25369A 1620010569656	F-16 CYL	3.45	0.0002	0.9977
160 69625A 1620004100874	CYLINDER	3.44	0.0002	0.9979
161 35571A 1620003353404	STOP ASY	3.42	0.0002	0.9981
162 18365A 1560009834324BF	WING SEC	3.00	0.0002	0.9983
163 T1435A 9999P000V0010A		3.00	0.0002	0.9985
164 T6779I 1620000563339		3.00	0.0002	0.9987
165 T7163A 1620001753939		3.00	0.0002	0.9989
166 69098A 1620003654001	BALLSCRU	2.88	0.0002	0.9991
167 68891A 1630008562195	FB111 BP	2.75	0.0001	0.9992
168 15616A 1630005678162	C141 BP	2.28	0.0001	0.9993
169 15438A 1630005802857	T-29 BRK	2.10	0.0001	0.9994
170 26110A 1620012005320	F16P18TO	1.97	0.0001	0.9995
171 T7043A 1620005343898		1.90	0.0001	0.9996
172 T9743I 1620010403581		1.87	0.0001	0.9997
173 69548A 1620007659187	CENT. CYL	1.75	0.0001	0.9998
174 74644A 1620001157393	TUBE ASS	1.66	0.0001	0.9999
175 34507A 1630005404253	F100 BRK	1.25	0.0001	1.0000
176 15162A 1630002692622	KC135BRK	1.05	0.0001	1.0001
177 T5652A 1630007947437		1.00	0.0001	1.0002
178 96274A 1650001685965BF	TURBINE	0.92	0.0000	1.0002
179 74535A 1620008699089	BRACE DR	0.88	0.0000	1.0002
MS404K 3120ND0232136BF		0.70	0.0000	1.0002
19959A 1620009195750	DAMPER	0.66	0.0000	1.0002
16214A 1620011252217	POWER UT	0.60	0.0000	1.0002
83 69566A 1620009535572	VALVE	0.58	0.0000	1.0002
84 745210 1620001877445		0.50	0.0000	1.0002
85 15387A 1630005557523	T38 BRK	0.38	0.0000	1.0002
96 16776A 1630008473731	A37 BRK	0.25	0.0000	1.0002
37 19681A 1620009383574	S-P UNIT	0.06	0.0000	1.0002

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ALC.SASCAN.CNTL(OO8020P)  
OGDEN 80/20 SORTED BY MANPRB

N S N	P C N	O P E R S	O B S E R	P G W S	P G W S	P N A S	P N A P	P R A S	P R A S	P R B S	P R B P	P R C S	P R C S	P P W S	P P W S	L T O T	C U M	
1620001099287	16837A	30	87	17	0.0129	15	0.0124	8	0.0176	1	0.0306	2	0.0722	29	0.0100	5200.55	0.025858	
1620001099288	16838A	11	15	0.0131	13	0.0137	9	0.0161	10	0.0279	3	0.0695	4	0.0296	24	0.0107	4870.74	
1620010204973	17565A	10	23	0.0099	10	0.0161	24	0.0083	6	0.0336	4	0.0551	8	0.0197	27	0.0102	4318.94	
3120P855928-03	M9662K	15	38	10	0.0197	8	0.0204	5	0.0085	5	0.0341	51	0.0049	54	0.0043	990.91	0.075886	
1620001398474	17143A	15	28	12	0.0161	9	0.0162	23	0.0084	6	0.0290	3	0.0414	54	0.0043	5134.89	0.101220	
1620001398473	17142A	15	28	116	0.0019	20	0.0106	15	0.0106	7	0.0302	1	0.0321	55	0.0043	4241.38	0.122145	
1620009485006	16915A	37	5	0.0393	48	0.0058	26	0.0081	14	0.0197	8	0.0285	9	0.0190	12	0.0190	2315.59	0.133570
1620010054191	17575A	37	33	0.0089	128	0.0017	80	0.0027	71	0.0028	9	0.0253	17	0.0132	87	0.0017	3744.30	0.152043
1620011951141	25737A	20	51	0.0052	46	0.0064	39	0.0055	40	0.0063	10	0.0237	21	0.0119	1342.79	0.158668		
1620010248844	16019A	20	51	0.0052	46	0.0064	39	0.0055	40	0.0063	10	0.0237	18	0.0130	191	0.0003	1633.71	0.166728
1620010627002	17402A	17	69	0.0040	30	0.0086	90	0.0024	25	0.0105	11	0.0230	39	0.0072	44	0.0056	1662.48	0.174930
1630010585912	19588A	5	166	21	0.0110	42	0.0070	31	0.0071	12	0.0224	59	0.0043	20	0.0117	2187.93	0.185725	
1630007776698	15068A	35	166	24	0.0088	45	0.0086	64	0.0039	13	0.0216	240	0.0004	20	0.0117	1508.12	0.193165	
1620009825059	15988A	21	3	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
1620010054192	17576A	21	3	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
1620010054193	17577A	21	3	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
1620010054194	74524A	21	5	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
16200024G8005	17578A	21	5	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
1620002990278	17478A	21	5	8	0.0264	65	0.0088	103	0.0020	14	0.0194	90	0.0025	72	0.0024	480.78	0.195537	
1620018877445	74521A	2	58	0.0045	74	0.0033	101	0.0021	36	0.0086	20	0.0146	44	0.0061	1069.49	0.249046		
1620010816339	19937A	2	58	0.0045	74	0.0033	101	0.0021	36	0.0086	20	0.0146	44	0.0061	1069.49	0.249046		
1620008961203	19844A	2	106	0.0021	53	0.0051	50	0.0046	41	0.0062	23	0.0125	22	0.0118	1275.75	0.254322		
1620006793440	17239A	2	106	0.0021	53	0.0051	50	0.0046	41	0.0062	23	0.0125	22	0.0118	1275.75	0.254322		
1620005459439	17354A	2	106	0.0021	53	0.0051	50	0.0046	41	0.0062	23	0.0125	22	0.0118	1275.75	0.254322		
162000785G073	16283A	2	106	0.0021	53	0.0051	50	0.0046	41	0.0062	23	0.0125	22	0.0118	1275.75	0.254322		
1620004427877	74527A	76	99	122	0.0017	51	0.0055	61	0.0042	33	0.0073	27	0.0104	51	0.0047	3785.10	0.266197	
1620009118301	17327A	76	99	122	0.0017	51	0.0055	61	0.0042	33	0.0073	27	0.0104	51	0.0047	3785.10	0.266197	
1620012007131	26111A	76	99	122	0.0017	51	0.0055	61	0.0042	33	0.0073	27	0.0104	51	0.0047	3785.10	0.266197	
1620008372427	17595A	76	99	122	0.0017	51	0.0055	61	0.0042	33	0.0073	27	0.0104	51	0.0047	3785.10	0.266197	
1620009921498	17407A	12	19	0.0012	109	0.0020	134	0.0011	165	0.0004	30	0.0092	84	0.0029	407.06	0.271208		
1620004325651	72877A	12	19	0.0012	109	0.0020	134	0.0011	165	0.0004	30	0.0092	84	0.0029	407.06	0.271208		
1630008329088	15583A	18	20	105	0.0021	70	0.0035	217	0.0008	146	0.0008	32	0.0090	125	0.0007	496.13	0.300388	
1620010063237	17527A	12	54	25	0.0088	12	0.0018	128	0.0009	128	0.0008	33	0.0083	74	0.0023	416.86	0.302836	
1620010597842	69354A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620000271193	72573A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620011037747	15866A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620006518221	17451A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620001791425	74692A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620006518222	17313A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620006133512	16912A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620007158562	42628A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
1620007158561	42625A	12	54	25	0.0088	12	0.0140	115	0.0009	21	0.0124	34	0.0076	19	0.0137	391.41	0.306823	
15600085613868F	14781A	18	54	71	0.0036	26	0.0005	109	0.0019	158	0.0005	42	0.0058	210	0.0002	270.16	0.318237	
1620007419178	17357A	18	54	71	0.0036	26	0.0005	109	0.0019	158	0.0005	42	0.0058	15	0.0155	1066.71	0.318237	
M4250K	14250K	1	1	200	0.0004	248	0.0003	174	0.0008	81	0.0023	46	0.0045	89	0.0027	327.61	0.319853	
1620004463776	72879A	106	51	200	0.0004	248	0.0003	174	0.0008	81	0.0023	46	0.0045	89	0.0027	327.61	0.319853	
1560010410545WF	69752A	106	51	200	0.0004	248	0.0003	174	0.0008	81	0.0023	46	0.0045	89	0.0027	327.61	0.319853	
1620011671000	26338A	8	26	95	0.0043	36	0.0074	83	0.0026	69	0.0011	48	0.0041	246	0.0001	828.29	0.325883	
1620002640744	17474A	8	26	95	0.0043	36	0.0074	83	0.0026	69	0.0011	48	0.0041	246	0.0001	828.29	0.325883	



**OGDEN 80/20 SORTED BY MANPRB**

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**FOR YOUR EASE, WE HAVE SUBDIVIDED  
THIS SECTION INTO THE FOLLOWING:**

- A - 2.1 FACILITY LAYOUT**
- B - 2.2 EQUIPMENT**
- C - 2.3 WORK FORCE**
- D - 2.4 REPAIR WORK TECHNOLOGIES**
- E - 2.5 WORKLOAD MIX AND VOLUME**
- F - 2.6 MATERIAL HANDLING**
- G - 2.7 STORAGE**
- H - 2.8 PROCESS FLOW CHARTS**

THE PROFILE SHEETS ARE IN THE  
FOLLOWING BOOKS

MANPGW	BRAKES
MANPGP	WHEELS
MANPWV	MAIN LANDING GEAR EXCEPT C5
MANPWW	NOSE LANDING GEAR EXECPY C5
MANPRA	C5 MAIN LANDING GEAR
MANPRA	C5 BOGIE BEAM.
MANPRA	NOSE LANDING GEAR.

## FOCUS STUDY

TITLE: A potential process improvement opportunity (PIO) exists to ALL Parts at RCC ALC  
at OOD ALC.

### POINT(S) OF CONTACT:

(TRACKING OF PARTS)

AS-IS CONDITION: WHEN A PART IS REQUIRED FOR A PARTICULAR ORDER OR PLANE.  
SOME ONE MUST FISCALLY GO OUT AND FIND THE PARTS. AND THEN  
FIND A SCHEDULER TO PUT THE PART ON THE HOT SHEET AND GET IT COMPLETED

TO-BE: - IMPLEMENT A SYSTEM. WHICH WOULD KEEP TRACK OF THE PARTS SO  
THAT YOU COULD FIND THE ITEMS NEEDED IN THE COMPUTER AND GET THEM MOVED  
WITHOUT HOURS OF TRACKING THEM DOWN IN THE SHOP.

POTENTIAL IMPROVEMENTS: - IMPROVED FLOW LESS TIME WASTED LOOKING FOR PARTS.

IMPLEMENTATION COST:

SCHEDULE:

## FOCUS STUDY

**TITLE:** A potential process improvement opportunity (P10) exists to COMPLEX PARTS at RCC MAR 1 MAR  
at 00 ALC.

### POINT(S) OF CONTACT:

**AS-IS CONDITION:** *MEASURE EACH FINISH DIMENSION BY ITS SELF NOT IN RELATION TO THE REST OF THE  
PART EACH MACHINED SURFACE COULD BE CORRECT AND STILL THE OVER ALL DIM.  
OF THE PART COULD BE OFF.  
WITH A COORDINATE MEASURING MACHINE YOU CAN CHECK ALL THE MACHINED SURFACES  
IN RELATION TO EACH OTHER.*

**POTENTIAL IMPROVEMENTS:** *LESS REWORK.*

**IMPLEMENTATION COST:**

**SCHEDULE:**

## **FOCUS STUDY**

**TITLE:** A potential process improvement opportunity (P10) exists to ALL PARTS at RCC NUMBER 1 MECHUARS  
at DO ALC.

### **POINT(S) OF CONTACT:**

**AS-IS CONDITION:** *THE MECHANIC GOES OUT TO THE WALL AND PICK OUT WHAT HE WANTS TO  
WORK ON NEXT. UNLESS A HOT JOB IS GIVEN TO HIM.*

**TO-BE:** *HAVE A SCHEDULER BRING THE PART TO THE MECHANIC.*

### **POTENTIAL IMPROVEMENTS:**

### **IMPLEMENTATION COST:**

### **SCHEDULE:**

## FOCUS STUDY

TITLE: A potential process improvement opportunity (PIO) exists to ALL Parts at RCC AU  
at 00 ALC.

### POINT(S) OF CONTACT:

(TRACKING OF PARTS)

AS-IS CONDITION: WHEN A PART IS REQUIRED FOR A PARTICULAR ORDER OR PLANE.  
SOME ONE MUST FISCALLY GO OUT AND FIND THE PARTS. AND THE  
FIND A SCHEDULER TO PUT THE PART ON THE HOT SHEET AND GET IT COMPLETED

TO-BE: - IMPLEMENT A SYSTEM. WHICH WOULD KEEP TRACK OF THE PARTS SO  
THAT YOU COULD FIND THE ITEMS NEEDED. ON THE COMPUTER AND GET THEM MOVED  
WITH OUT HOURS OF TRACKING THEM DOWN IN THE SHOP.

POTENTIAL IMPROVEMENTS: - IMPROVED FLOW LESS TIME LOOKING FOR PARTS.

### IMPLEMENTATION COST:

### SCHEDULE:

## FOCUS STUDY

**TITLE:** A potential process improvement opportunity (PIO) exists to COMPLEX PARTS at RCC MRB 17MRH  
at 00 ALC.

### POINT(S) OF CONTACT:

**AS-IS CONDITION:** MEASURE EACH FINISH DIMENSION BY ITS SELF NOT IN RELATION TO THE REST OF THE  
PART EACH MACHINED SURFACE COULD BE CORRECT AND STILL THE OVER ALL DIM.  
OF THE PART COULD BE OFF.  
**TO-BE:** WITH A COORDINATE MEASURING MACHINE YOU CAN CHECK ALL THE MACHINED SURFACES  
IN RELATION TO EACH OTHER.

**POTENTIAL IMPROVEMENTS:** LESS REWORK.

**IMPLEMENTATION COST:**

**SCHEDULE:**



**FOCUS STUDY**

**TITLE:** A potential process improvement opportunity (P10) exists to ALL PARTS at RCC MINNEAPOLIS  
at OO ALC.

**POINT(S) OF CONTACT:**

**AS-IS CONDITION:** *THE MECHANIC GOES OUT TO THE WALL AND PICK OUT WHAT HE WANTS TO  
WORK ON NEXT. UNLESS A HOT JOB IS GIVEN TO HIM,*

**TO-BE:** *HAVE A SCHEDULER BRING THE PART TO THE MECHANIC.*

**POTENTIAL IMPROVEMENTS:**

**IMPLEMENTATION COST:**

**SCHEDULE:**

## Section F--Miscellaneous

**4-10. Depot Maintenance Personnel Turnover.** The annual rate of turnover of personnel performing depot maintenance. This rate is based on the average number of civilian personnel assigned to AFLC depot maintenance functions during calendar year 1985 and the total depot maintenance personnel losses experienced during that year. The source of the data is the Advanced Personnel Data System-Civilian (APDS-C), E300. The OPR is HQ AFLC/DPCC.

## 1985 Depot Maintenance Personnel Turnover Rate

$$\frac{\text{Losses } 2,449}{\text{Assigned } 40,109} = .0611$$

**4-11. AF Maintenance Personnel Turnover.** The annual rate of turnover of enlisted personnel performing Air Force base level maintenance. This rate is based upon the total number of enlisted personnel assigned to aircraft maintenance Air Force specialty codes at the end of FY85 and the total number of losses experienced during that year. The source of the data is the Retention Statistic Report prescribed by AFM 30-130, Vol 1 and the Airman Force Characteristics P769 Report Prescribed by AFR 30-3 and AFR 700-4, Vol 1 and Vol 2. The OPRs are HQ AFMPC/DEPMATE and HQ AFMPC/DPMYA

## FY85 AF Maintenance Personnel Turnover Rate

$$\frac{\text{Losses } 18,923}{\text{Assigned } 147,567} = .1282$$

**4-12. Monthly Assigned Hours.** The number of hours per month a military or civilian employee is assigned for duty. Monthly assigned hours is based on a 5-day 40-hour work week. This factor equals calendar days per month less holiday and relief days (Saturday, Sunday, or compensatory weekday for weekend workday) times hours per day. The standard Air force monthly assigned hours used in allocating manpower is 167.929 hours. The source of the data is AFR 26-1. The OPR is HQ USAF/PRM. The prescribing directive is AFR 26-1 (Vol III).

**4-13. Annual Available Hours.** The number of hours per year a military or civilian employee is available for primary duty. Annual available hours is equal to monthly assigned hours less total nonavailable hours (leave, PCS related absences, medical leave, organizational duties, education and training, social actions, miscellaneous, overseas peculiar activities and special absences) times 12 months. The standard annual available hours for military and civilian personnel are presented. The source of the data is AFR 26-1. The OPR is HQ USAF/MPM. The prescribing directive is AFR 26-1 (Vol III).

Calendar days	30.4375
Less:	
Holiday	0.75
Relief Days	8.6964
Assigned Days	20.9911
Times hours per day	8.0
No. Assigned hours	167.929

	Military		Civilian	
	CONUS	OS	CONUS	OS
Monthly Assigned Hours	167.929	167.929	167.929	167.929
Less Total Nonavailable	22.730	24.464	22.65	20.76
Monthly Hours Available	145.2	143.5	145.3	147.2
Times Number of Months	12.0	12.0	12.0	12.0
Annual Hours Available	1742.4	1722.0	1743.6	1766.4

1744

# WAGE For Over Time

DIRECT \$18.66

INDIRECT 10.06

OVERHEAD 3.27

TOTAL 31.98

BASE SALARY - WITH NO BENEFITS. \$12.44

STANDARD HOURS WORK PER 1 MAN 1744 HRS

OVERTIME IS 7½% OF THE TIME

$(1744 \text{ HRS})(7.5\%) = 130.8 \text{ HRS. OVERTIME / MAN}$

OVERTIME PAY = BASE PAY  $(12.44)(1.5) = \$18.66$  For OT.

PAY FOR.

A. STANDARD HRS. =  $(1744 \text{ HR}) \left( \frac{\$31.98}{\text{HR}} \right) = 55,773.12 \text{ MAN/YEAR}$

B OVERTIME HRS.  $(130.8 \text{ HRS}) \left( \frac{\$18.66}{\text{HR}} \right) = 2440.73 \text{ OT PAY}$

Total Pay with OVERTIME ONE MAN = 58213.85

*JP 11/3/87*

ENGINEERING NOTEBOOK

ALAN TURNER

00-ALC

MACHINE  
SHOP

&

GRINDING  
SHOP

Forman: Bill Phillips

Based on the conversation I had with Bill it seems that although the volume of work through his area is fairly constant, his workload per man goes up markedly in the summer months due to vacations. He said that the Air Force in general logs more flight time in the summer months resulting in a slight increase in work volume, but his big problem is still manpower shortages due to vacations.

With regards to 7b factors Bill suggested checking with Planning for details. He said that generally, the level of repair needed per part <sup>varies</sup> ~~very~~ greatly depending on the part itself. For example, the B-52, C-141, C-5A & KC-135 all have parts that come into his area needing 100% repair 100% of the time. They also, however, come in with any possible lower % of needed repair.

Bill stated that he does not have exact records of his condemnation rate & suggested contacting E & I for that information. His gut feeling is that most parts are condemned before they get through E & I.

When asked about his personnel Bill said he was short everywhere & that he felt it would get worse due to forced labor reductions.

His brief description of how the shop

handles training it's people leads me to believe that there is little room for improvement in this area. The way they handle it is as follows :

- \* trained on one machine
- \* trained on all the machines in one area
- \* trained on one machine at a time in an area other than the men's original area
- \* this process continues until the men has become familiar with all the machines & operations in the machining & grinding area

Training on any one machine includes learning to functionally operate the machine, set-up & run all the operations performed on that machine & finally, to check the parts.

It should be pointed out that there is no final inspection of re-manufactured parts. The operators are responsible for checking the dimensional accuracy of their work. This is all part of the P.A.C. (Product Acceptance Certification) program in place. This plan essentially makes the operator solely responsible for his work. Bill feels that this system works pretty well.

Getting back to training, there are training monitors on the floor to oversee & provide assistance to people in training who need it & there is a training supervisor who schedules & keeps track of everyone's progress through the system.

Bill feels that the general condition of his machine tools is good. There is a group whose function, among other things, is to monitor

the age of machine tools. ~~After a pre-specified~~  
~~length of time has elapsed since the~~  
purchase of a given machine, that  
machine shows up on a monthly computer  
printout calling for that machine's  
electro/mechanical evaluation. If the supervisor  
of the area in which that machine  
resides says the machine needs replacement,  
the paperwork process to order a new,  
appropriate piece of equipment is begun.

When equipment fails before it's time,  
there are forms & a procedure for repairing  
or in extreme cases, replacing it.

Currently, the shop is slowly going N/C.  
This trend can be seen in the grinding  
shop in Bldg. 505 where several old  
manual grinders are being replaced by N/C  
equipment.

Bill has indicated that smaller items (gages,  
indicators, micrometers, etc.) are not a problem.  
If they need something, they buy it.

With regards to shifts, there are 110 people  
on first, 23 on second & no third. This  
is for both the machine & grinding shops.  
Neither shop works much O.T.

Response time to Form 103's varies from 1 day  
to 2 months depending on who the M&M engr.  
is for the part in question.

When asked what he would most like to  
have to improve the machine & grinding  
shops he tended on personnel. He pointed



out that morale was bad & he had a high turnover rate of people. Morale seems to be low because they have been reducing their manpower without reducing workload & increasing operator responsibility without increases in pay. (I'm ~~referring~~ inferring the pay problem, Bill actually mentioned the increase in responsibility) Bill blames the turnover rate on job boredom.

## Summary & Suggestions

Equipment & hardware seem to be under control in both shops. The big problem seems to be people oriented.

Workload per operator is only going to increase as labor reductions continue. Boredom is caused by mundane, repetitive work or general lack of interest in the job at hand.

As the operator does his own set-up work & is being moved from machine to machine I don't see the work as being all that repetitive. Consequently, ~~I~~ I feel lack of job interest is the problem.

I doubt that the people working in the shop feel much connection with the F-16's they see flying overhead. To them their job is to bore a few holes, grind an O.D. or two, press the occasional bearing & in general perform a variety of machine operations on non-descript forgings.

Hold a class. Explain to them how "their" parts fit together & function. Let them see what they make being installed on the aircraft. The occasional word of thanks from a pilot or aircrew member would also help to remind the shop people that what they do is VERY important to some people. Try to get your shop people in an aircraft. Make them feel like part of the team that puts the Air Force in the air. Most people did not go to see "Top Gun" to look at Tom Cruise & Kelly McGillis. They went to see fighter planes. Try to make these people part of that.

If you can't do this & the turnover rate stays high it would make more sense to drop the extensive training program now in place & give each operator ~~one~~ machine.

There's no sense investing time, effort & money into people who aren't going to stay.

If you get into a one man - one machine mode your run times should come down as the operator becomes more familiar with the machine & its operations.

Tom's responsibilities cover KC-135 & C-5 wheels.

His job is to see to it that KC-135 & C-5 parts flow smoothly thru the shop. His job seems to be that of an expeditor with the added responsibility of acting as liaison between the shop and M&M engineering when his parts get written up on form 103 (discrepant material).

He estimates that there are roughly 75-100 form 103's written per month for all wheels passing through the shop.

The standard turn around time on form 103 parts is 3-10 days. He seemed pleased with this & did not consider it a big problem.

He states that his workload of parts is stable throughout the year.

Tom also stated that few, if any changes to the WCO's came from the shop floor people. Most changes came thru M&M engr. either originating with that dept. or passing through it after being generated by the part manufacturer.

As Tom is not involved with the actual shop process he did not have any suggestion as to how to improve it, nor did he feel himself to be in a position to rate the shop's performance. He merely stated that he sometimes wished parts would flow more smoothly from point to point.

Planner: Kerry Loop

Kerry's responsibilities cover KC-135, F-15 & F-16 struts.

He estimates that he handles approximately 60 Form-103's per month on his parts.

Kerry states that the turn around time on his 103's is between 7-10 days depending on who the M&M engr. is. Kerry does not seem to think this is a problem.

His workload is stable throughout the year.

The few changes that occur to his W.C.O.'s are generated equally by M&M Engr. & suggestions from the shop floor.

With regards to potential shop improvements, Kerry said that a smoother flow of work would be desirable. Currently the shop processes work as it becomes 'hot'. He feels that maybe the implementation of MRP II will help.

Planner: Frank Rigby

Frank is responsible for brakes for all the aircraft serviced at Hill.

He says that while there are minor fluctuations in his volume of work on a short term basis, his workload over the year is steady.

He tells me he gets good response from MM Engr. on his 103's & the average turn around time is roughly 4 days.

Frank states that his WCD's change frequently & that most of the changes are shop driven. He gets his changes as a result of operator/supervisor suggestions or in response to recurring 103's.

His only complaint about the shop was that they have a tendency to lose parts as they move through the building. They eventually turn up again but he feels a little more control over the flow of material in the building is called for.

## Scheduling: Reuben Velerio

Reuben is the head of scheduling for the areas assigned to me. He tells me that his workload for the machine & grinding shops is stable throughout the year.

He also says that he's got more work than people to handle it. From an equipment standpoint he feels that the shop has plenty of capacity. They will occasionally have to juggle machines if they get a rush of one type of part but to date this sort of thing has never caused them to fall behind on the rest of their workload.

Reuben stated that the only thing that holds up the shop to his knowledge is a lack of bushings. Other than getting additional machinists, which he concedes is not going to happen, the bushing shortage is his only complaint. He made special mention of the fact that he is very happy with the people in his group.

## THE PLAN

IN THE BEGINNING WAS THE PLAN -  
AND THEN CAME THE ASSUMPTIONS -  
AND THE ASSUMPTIONS WERE WITHOUT FORM -  
AND THE PLAN WAS COMPLETELY WITHOUT SUBSTANCE -  
AND DARKNESS WAS ON THE FACE OF THE WORKERS -  
AND THEY SPAKE AMONGST THEMSELVES, SAYING  
"It is a crock of shit and it stinketh."  
AND THE WORKERS WENT TO THE SUPERVISORS AND SAYETH  
"It is a pile of dung and none may abide the odor thereof."  
AND THE SUPERVISORS WENT TO THE PLANNERS AND SAYETH UNTO THEM  
"This is a container of excrement so strong that none may abide by it."  
AND THE PLANNERS WENT TO THE SECTION CHIEFS AND SAYETH UNTO THEM  
"It is a vessel of fertilizer and none may abide its strength."  
AND THE SECTION CHIEFS WENT TO THE BRANCH CHIEFS AND SAYETH  
"It contains that which aids growth and is strong."  
AND THE BRANCH CHIEFS WENT TO THE DIVISION CHIEF AND SAYETH  
"It promoteths growth and is very powerful."  
AND THE DIVISION CHIEF WENT TO THE CHIEF OF THE DIRECTORATE  
AND SAYETH UNTO HIM  
"This powerful new plan will actively promote the growth and  
efficiency of the Directorate."  
AND THE CHIEF OF THE DIRECTORATE LOOKED UPON THE PLAN AND  
DECLARED IT GOOD -  
AND THE PLAN BECAME POLICY!!!

NOTE: The biggest problem that exists here is a management problem. "The Plan" came from one of your shop people. The people on the floor are VERY aware of the fact that no one is totally in command & that those with some authority quite often are too far removed from reality (i.e. the shop floor) to make good, sound decisions concerning shop operations.

This state of affairs is not conducive to a high level of motivation in your people. You have enough good people & plenty of adequate equipment to improve your throughput by at least 25% if you get good leadership.



Kent ALL PARTS ROUTED TO STATION 69, GO TO THE FOLLOWING FOREMAN  
~~BAMBROUAK~~  
~~1. BATHALE~~

C141 - ALL EXCEPT:

DRAG BRACE (7877) - LUDDINGTON

TORQUE ARM (6869) - LUDDINGTON

BOGIE BEAM (8005) - TROUT

F111 - ALL

KC135 MAIN - ALL

KC135 NOSE - BRACE ASSY (9178)

B52 - ALL EXCEPT: M. OUTER, TIP, & DRAG STRUT ASSY

F106 - ALL

C130 - ALL

A7D - ALL

C7A - ALL

LGM - 30 - ALL

F4 MOD - WET (LUCAS)

ALL PARTS ROUTED TO STATION 69, GO THE FOLLOWING FOREMAN:

2. JACK LUDDINGTON:

C5A - ALL

C141 DRAG BRACE (7877)

C141 TORQUE ARM (6869)

KC135 NOSE - INNER & OUTER  $\angle$  / 1 1 1 1

F4 ALL EXCEPT:

MAIN PISTON

ORIFICE TUBES ( MAIN & NOSE )

F-15 - ALL

F16 - ALL

A10 - ALL

T38 - ALL

CH-3 - ALL

OV10 - ALL

B52 - MAIN OUTER, "TIPS",

& M DRAG STRUT ASSY

3. LEONARD TROUT:

ALL WHEELS & BRAKES ( STATORS, PRESSURE & BACKING PLATES)

— C141 BOGIE BEAM ( 8005 )

F4 MAIN - INNERS & ORIFICE TUBES

F4 NOSE - ORIFICE TUBES